POPULAR Computing WEEKLY

35p 25 November 1982 Vol 1 No 32

This Week

Micro music
Jon Chambers looks at the musical abilities of the Atari, Vic20 and Dragon 32. See page 12

Vic20 monitor
Colin McCormick presents a machine code monitor for the Vic20 that allows hex to be entered, edited, listed, deleted and inserted. See page 23.

Dragon page
Brian Cadge explains how to mix text with hi-res graphics while Paul Stead presents a clock program on page 25.

Starlord
Brendon Gore talks to Mike Singleton about Starlord — a computer moderated, play-by-mail, game. See page 11.

ZX81 Missile Strike
Can you obliterate the enemy ships before they destroy your missile base? Find out in David Lawrence's new game for the 16K ZX81 on page 8.

News Desk

Atari drops injunction attempt against Commodore

by David Kelly

ATARI has withdrawn its application for an injunction against Commodore, regarding infringement of its *Pac-Man* copyright.

The company was applying for an interim injunction to restrain Commodore from sale of the *Jellymonsters* game.

Instead, Atari has been granted an order for speedy trial and is pressing ahead with its main action against Commodore.

"Atari expects to secure both an injunction and damages for Commodore's infringement of Atari's rights as a result of the full trial which will take place early next year," explained an Atari spokesman.

John Baxter, for Commodore, commented "Up until Tuesday we thought they were going ahead with the injunction proceedings. We were ready to fight it but Atari withdrew its application."

The decision by Atari to drop the temporary injunction attempt appears to have been taken in the light of the company's failure to gain similar injunctions in Hong Kong earlier this year.

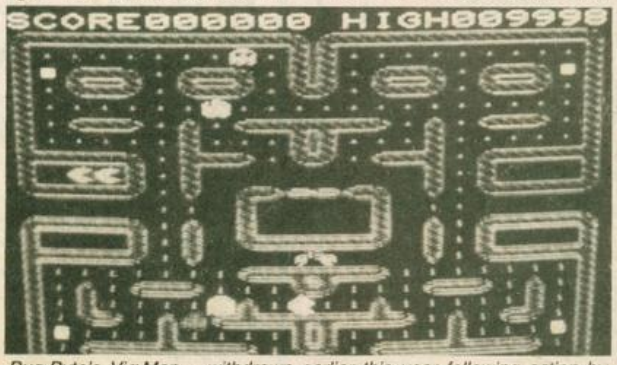
In October Atari failed to obtain interim injunctions against two Hong Kong companies, Video Technology and Soundic Electronics. These applications were refused by the judge because they were made on the basis of a "novel point of law".

The purpose of such an interlocutory injunction is to halt offending behaviour pending a full trial. Such a trial can take up to two years to come to court. The interim injunction is intended as a quickly applicable stop-gap measure which remains in force until the outcome of the trial is decided.

However, to secure such an order the plaintiff — Atari in these cases — must prove that the 'balance of convenience' is on its side.

It is also necessary to show that any damages incurred before the trial, as a result of refusing the injunction cannot be rectified later.

Continued on page 5



Bug-Byte's Vic-Men – withdrawn earlier this year following action by Atari.

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POPULAR Computing WEEKLY

25 November 1982 Vol 1 No 32

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How to submit articles
Articles which are submitted for publication should not be more than 3,000 words long. The articles, and any accompanying programs, should be original. It is breaking the law of copyright to copy programs out of other magazines and submit them here — so please do not be tempted.

All submissions should be typed and a double space should be left between each line. Please leave wide margins.

Programs should, whenever possible, be computer printed.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

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Editorial

The boom in microcomputers over the last 18 months has seen the growth of myriad support industries. Software houses, dealer networks and hardware add-on manufacturers have sprung up almost overnight.

But, one effect of the micro revolution that has been little remarked outside of the publishing industry, is the phenomenal growth in the number of computer magazines and books. Two years ago *Practical Computing* and *Personal Computer World* ruled the roost. Now there are more than 30 titles to choose from, not to mention those such as *Personal Computer News* which are to be launched next year.

At a time when many publishing companies are struggling to stay alive, computer magazines are proliferating like atoms in a fast-breeder reactor that has gone out of control.

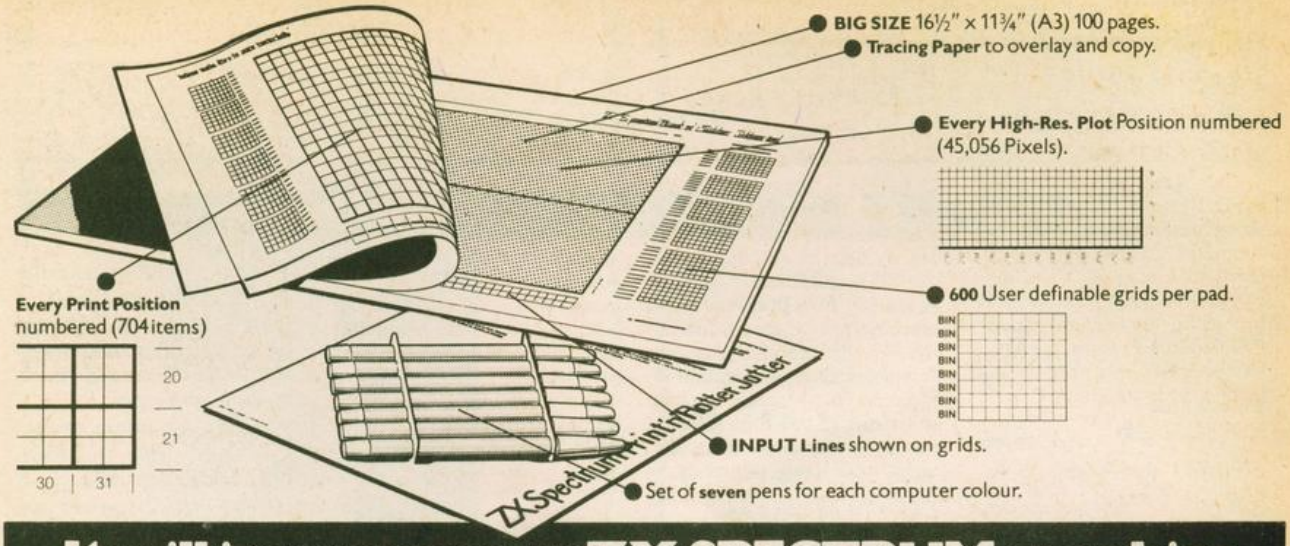
The computer press is, by and large, a reflection of the micro world. The magazines are young, competitive and enthusiastic.

However, the micro market must be close to saturation, if it is not already past it. New magazines are going to find it increasingly difficult to establish themselves.

Next Thursday

The alien ships have one goal — the destruction of your base. Can you survive their continuous attacks? Find out in Suntrap — a new game for the 16K Spectrum by Mike Moscoff.

Also next week, a round-up of Dragon's own software. John Scriven reviews a range of Dragon cassettes and cartridges and decides whether or not it represents value for money.



It will improve your ZX SPECTRUM graphics in ways you wouldn't believe possible.

Your new ZX Spectrum is literally packed with sophisticated graphics. Colour. High resolution. Plot. Draw. Circle. Border. Ink. Paper Colours. User-defined characters to name just a few!

That's why we have packed the new Spectrum Print 'n' Plotter Jotter with every facility to exploit your graphics to the full.

After the first few weeks of "playing" with your computer you will want to get down to serious programming and planning in which professional-looking graphics should play a major part.

What better way to work it out than with a Print 'n' Plotter Jotter?

The professional pad

Print 'n' Plotter is not just another programming pad.

Just look at the specifications:

BIG SIZE 16½" x 11¾". 100 Pages — 50 Print Grids and 50 High Resolution Plot Grids.

Printed on high-quality tracing paper, enabling you to overlay the pages for direct co-ordination between PRINT and PLOT or to copy from illustrations, maps, charts, photos etc.

PRINT Grids show all numbered co-ordinates for the 704 screen positions, plus INPUT lines.

PLOT Grids show every numbered co-ordinate for the 45,056 Pixels!

Each pad contains 600 user-definable grids for use with the BIN n, POKE USR "a" function.

And the whole thing is fully bound with fly leaf cover and complete with a set of seven colour pens!

The simple way to get serious

Spectrum Graphics can become very complex, so before you start to program the best way is to work it out on a Print 'n' Plotter and save all those errors!

Take for instance the common CIRCLE. With a Jotter you can establish the exact screen location for the centre in seconds, and it will stop you running out of screen because of a too large radius. Working our DRAW is similar: pre-determine DRAW lines and PLOT positions before you start. With a Jotter you can build-up graphics using every facility with a direct co-ordination between each.

For instance, correct PLOT OVER or PRINT OVER positions will be easy with a Jotter.

See the show for just 60p!

To demonstrate the graphic possibilities with the SPECTRUM JOTTER we have produced a cassette-based Demonstration program for only 60p (inc VAT and P&P). Why not send for a copy, or order it together with your JOTTER?

Just part of a range of ZX products

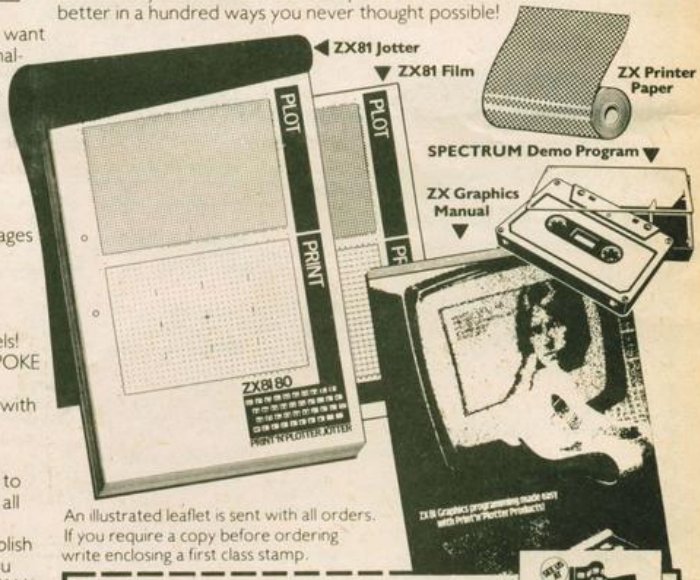
The Spectrum Jotter is, of course, an upgraded version of our popular *ZX81 Print 'n' Plotter Jotter and Film*. For ZX81 owners these are available by direct mail or through a growing number of retailers and compshops.

The ZX81 Jotter is a 100 page Graphics pad that exploits to the full the graphics facilities of that micro. ZX81 Film is a matt film version of the Jotter which is re-usable and ideal for 'copying' graphics.

Our manual: "*ZX Graphics programming made easy*" explains everything you need to know about using the ZX81 products, and when used in conjunction with the Spectrum cassette will prove to be the definitive guide to the subject.

And for ZX users (whether Spectrum or ZX81) we still market Printer Paper at £1 less than Sinclairs!

Why not write and place your order today? Graphics can be a very serious subject . . . Print 'n' Plotter products can make it easier . . . and better in a hundred ways you never thought possible!



An illustrated leaflet is sent with all orders. If you require a copy before ordering write enclosing a first class stamp.

To: Print 'n' Plotter Products (P)19 Borough High Street, London SE1 Please forward me the following products:

..... ZX SPECTRUM JOTTERS @ £9.95 each.
..... ZX81 JOTTERS @ £3.50 each.
..... ZX81 PLOTTER FILMS @ £2.25 each.
....."GRAPHICS PROGRAMMING MADE EASY" MANUALS @ £1.50 ea
..... PACKS OF ZX PRINTER PAPER (5 ROLLS) @ £10.95 per pack.
..... ZX SPECTRUM DEMO CASSETTES @ 60p each.

PLEASE NOTE ALL PRICES INCLUDE POST, PACKING AND VAT FOR U.K. DELIVERIES (Overseas should add 25% for additional Surface Mail)

Remittance enclosed payable to Print'n'Plotter Products.
Please bill my Access/Barclaycard/Visa/Mastercard No:–

Name: .....

Address: .....

.....

Print 'n' plotter Products

Most Print 'n' Plotter products are available 'over the counter' from the following retailers: • Specialist branches of W H Smith • Buffer Micro Shop Streatham • Microware Leicester • Denny's Booksellers London EC2 • Georges Bookshop Bristol • Also represented in U.S.A., Canada and South Africa.

Atari drops injunction

continued from page 1

The Judge, in refusing the Hong Kong applications, has recognised that copyright of computer programs is not a clearly defined area of the law.

By withdrawing its interim injunction application against Commodore in the UK, Atari has averted the possibility of having the injunction refused.

"Atari has not climbed down," said its spokesman. "Atari has stood over its application to ensure that the court would have the opportunity to decide the issues on a fully developed case."

Another factor in the decision not to continue with the application was undoubtedly that failure would open the way for other companies to recommence sales of *Pac-Man* type programs.

Having successfully obtained a 'speedy trial order, Atari can expect a full trial to be heard in the Spring of next year, possibly as soon as February.

Atari gets Softcell keyboard

SOFTCELL is now selling a moving keyboard add-on for the Atari 400.

Called the B Key 400 it replaces the Atari 400's touch-sensitive keyboard with a full-stroke typewriter-style one.

Softcell's Chris Harwood said: "It is a straightforward replacement — function for function. No soldering is needed and it only takes a couple of minutes. You just pick up the membrane and ribbon, put in our new ribbon and clip on the B Key 400 board."

The unit is available mail-order from Softcell, 26 Great Cornbow, Halesowen, West Midlands, for £79.95.

Commodore 64 is on the way

THE first batch of the new Commodore 64 micro-computers should have been dispatched to dealers on November 19.

Commodore hopes to sell more than 6,000 of the machines in the UK before Christmas.

Epson launches QX10 as rival to Sirius/IBM

EPSON has announced a new desk-top microcomputer, less than two months after revealing its first micro, the HX20 portable computer.

Called the QX10 the new machine will be shown first at the *Which Computer Show* in January and will go on sale at the end of March. Costing substantially less than £2,000, it will be a competitor for the Sirius and IBM computers.

The processor unit is Z80-based, CP/M compatible, with 192K Ram expandable to 256K. It includes twin Epson disc drives with 320K storage per disc. Ports include serial, parallel and cassette with five-option card slots. There is also an optical-fibre interface. Cards available will include 16-fount character generator, four serial interface card, colour card, music generator, joystick, bar-code, a/d and d/a, modem and Omninet interfaces. The monochrome display output offers a 640 × 400 pixel format. Special features of the display include *Pan* and *Zoom* (6:1) commands.

The unit will be supplied with a green-screen monitor and a keyboard including 14 definable keys.

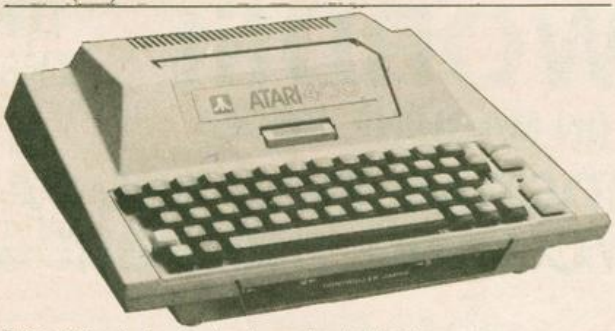
Rivals for the QX10, the Act Sirius 1 (or Victor 9000) and IBM Personal Computer both have a starting price over £2,300.

Sinclair's Spectrum delays over

SINCLAIR Research is claiming that delays in Spectrum deliveries are at an end.

According to their spokesman, the backlog of orders for its 16K and 48K Spectrum microcomputers was cleared by the first week of November.

"We are in a stock situation," he said. "All orders received after the middle of October will be fulfilled within 28 days and, by the middle of November, we will have supplied well over 60,000 machines."



B Key 400 replacing the touch-sensitive keyboard.

Sinclair software protection

SINCLAIR Research has sent letters to a number of software houses, advising them against "passing off" their products as Sinclair ones.

In a list of guidelines proposed in the letter the company advises that: the Sinclair logo is copyright, ZX Spectrum is a registered trademark and artwork for cassette inserts should not carry the Sinclair name prominently.

The move emphasises how important Sinclair considers the software market to be. In a recent interview with *Popular Computing Weekly*, Nigel Searle, head of the company's computer division, said: "The ZX81 is a learning machine. The Spectrum is altogether different and the profits to be made on software are high. Somebody is going to produce the software for it and it might as well be us."

Offending advert

DRAGON DATA has withdrawn one of its advertisements for the Dragon32 microcomputer following complaints.

The 'Read this ad to your wife' campaign has been attacked as sexist. The text includes: 'The Dragon offers 32K Ram. Your wife may not understand that, so just tell her that the Dragon's capabilities are truly massive.'

£6,000 Golden Sundial of Pi.

Golden gauntlet thrown down

GLITTERING prizes are being offered as a new software concept begins to take hold.

Three companies have so far moved into this 'treasure quest' arena.

Pimania is an adventure game for the 48K Spectrum, 16K ZX81, 32K BBC or Dragon 32 microcomputer, produced by Automata Ltd. In the game "where saxophones turn in to hang-gliders and music meets madness", the first to solve the quest and find the Golden Sundial of Pi on their screen will win the original work.

The real Golden Sundial of Pi, valued at over £6,000, has been specially commissioned from Barbara Tipple, winner of the De Beers Diamond International Award. Fashioned from gold, lapis lazuli, obsidian and diamond, the piece, when aligned, can be used to determine the time.

Artic has launched, simultaneously here and in the US, a 16K adventure, *Krakit*, with a £10,000 cash prize to the person who solves the 12 special clues. The game is for the ZX81 and TS1000 and went on sale on November 1.

Another company, Understanding Ltd, is giving £100 to the entrant who obtains the highest score in their *Awari* game, when played at the most difficult level — Monster Level. *Awari* is for the ZX81 and is based on a West African game in which the idea is to move counters into a particular order in competition with the computer. The competition closes on January 10.

ADD ON, PLUG IN, PRINT OUT

AMBER 2400 MATRIX PRINTER

the flexible print out facility for home computers.

At long last it's possible for every home computer user to have a hard copy of program listings. The AMBER 2400 Matrix Printer is the first low-cost complete printer with the flexibility of parallel or serial inputs to make it compatible with most home computers.

Priced at just **£69.95** plus VAT and £2.95 for postage and packing, the AMBER 2400 has a most impressive specification.

● 24 characters per line standard text ● Full graphics capability – each dot is individually programmable ● Conventional 25 pin 'D' type plug ● Serial and parallel input ● CTS/Busy output ● Serial baud rate selectable from 75 to 9600 baud ● Mains Powered ● Injection moulded case for strength ● Size of just 80mm x 160mm x 160mm (H x W x D) ● Uses low-cost plain paper rolls (90ft for 45p) ● This is not a thermal or spark discharge type printer

This is the printer you need, write now telling us what computer you use, including a SAE, and we'll send you the AMBER 2400 Matrix Printer leaflet.

£69-95

AMBER CONTROLS LTD.
Central Way, Walworth Industrial Estate,
Andover, Hampshire.

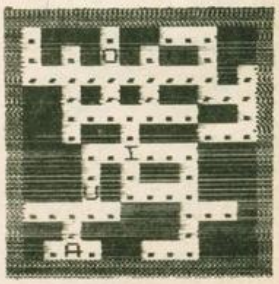
WORDfit

16K ZX81

(IN MACHINE CODE)

THE PROGRAM SETS THE PATTERN YOU KNIT THE WORDS

1. Program will not allow you to input the same word twice
2. Cell pattern set at random
3. Choice of 4 square sizes
4. Copy screen at any time
5. Rub out entire square, part of word, whole word or last letter
6. Can instruct program to insert vowels
7. Statistical analysis on screen continuously



£5

RAM WRITER
3 VUMBA HOUSE
2 CEDAR GARDENS
SUTTON, SURREY
SM2 5DB

RAM WRITER

Proving the pudding

Having had only an elementary education (and that was 65 years ago), I am lost in the world of computers and mathematics. My attempts to square the circle on my Spectrum have run into difficulties. However, I have managed to "circle the square" — in fact I stumbled on it just playing around. Try this:

```
10 PLOT 55, 85
20 DRAW 125, 60, 400
```

This draws a large circle using straight lines only, very queer as far as I am concerned. While the circle is being drawn you cannot use *Break* to stop it, why not?

Different numbers in place of the 400 in line 20 give very funny results. Try 200000000.

I have improved my Spectrum a lot by covering the keys with a piece of "cling film". I hold it down with one or two bits of Cellotape here and there. It gives the keys a harder feel and keeps out bits of food etc (I use my machine through meals, too).

J Livingstone
29 Mayne Avenue
Luton
Bedfordshire LU4 9LR

Office of fair trading

I recently returned my ZX81 to W H Smith for repair, the problem being the H, J, K and L keys cease to function after about three minutes. Upon switching off and restarting they would again function for about three minutes and stop. All other keys worked normally.

As my ZX81 is still under guarantee I thought everything was all right. Not so. W H Smith inform me that a charge of £19.47 is required for "damage to keyboard, not covered by guarantee". Apparently the keys have been pressed too hard. I should add the computer has been in constant use since it was purchased on December 21, 1981.

Also, a further handling charge of 33 percent was required by W H Smith because, as I quote, "we will not be making anything out of it for ourselves". I shall be contacting my local trading standards office and will let you know the results.

Alan Jones
24 Old Forge Road
Loudwater
High Wycombe
Buckinghamshire

Ordering procedures

I enjoy *Popular Computing Weekly* greatly but there are one or two suggestions I should like to make, both concerning hardware reviews. The first concerns the Rom. Could you list all the commands and procedures (e.g. *If-Then-Else, Renumber*).

The second is to ask for some benchmarks such as the time to draw 1,000 random hi-res points, a *For-Next* loop of 10,000, etc.

David Little
12 Bistwith Grange
Bistwith
Nr Harrogate
Yorkshire
HG3 3AH

Desirable location

In your September 9 issue you failed to tell Stephen Clements that a form of *Print At* is available on the Vic20.

It is placed starting at kernal routine G5520. Although there is no direct Basic command, it can be incorporated into a program. This is done by loading the *X* and *Y* registers with the required values.

The *X* register is held at 781 and *Y* at 782. Sp by *Poking* the *X* value into the *Y* register and the *Y* value into the *X* register, and then calling the machine code by *SYS* G5520, the cursor may be moved to the desired location.

David Porter
8 Sunnyside Drive
Clarkston
Glasgow G76 7PU

League table results

I see from your issue Vol 1 No 25, dated October 7, 1982, that you found space in which to publish my program *League Table.*

However, I notice you did not include my correction for line 550. The comparison should have been '> (greater than)' not '< (less than'. The line should have read:

```
550 IF TN(5% > TN(5% + 1)
PROCSWITCH.
```

The program has successfully been run since the start of the football season and an addition has been added to print the results of each run of the program as well as the league positions.

B H Gagg
1 Evans Close
Brampton
Cambridgeshire PE18 8UH

Tread softly, pilgrim

Having purchased a Commodore adventure game, at great expense, I am writing to disclose my disappointment. I read recently (*Popular Computing Weekly*, October 7) of the excitement of working through the stages of an adventure, collecting treasures on the way. I consider myself to be of at least average intelligence, but for God's sake, how does one get out of a quicksand bog carrying inventories at the same time?

There must be something about "Paul's Place" but I'm blowed if I know. How do you shift the bloody bear (maybe with honey??) How do you get the damned honey?? What use is the magic word "Bunyon" when all it does is rip something useful away from you.

There must be another route somewhere for I still have four treasures to locate, let alone store. I've tried everything and the greatest mystery ever is how one cools down or crosses a lava stream (having been informed that there is something there). And what about the blasted broken sign? There are no words in my Oxford dictionary which begin with "LA" and serve a useful purpose on this adventure.

And what are the other two ways of waking the dragon (apart from mud)? Someone please give me some hints — I'm going insane!

Clive Allman
119 Pinner Road
Oxhey
Herts

Some of your problems are related. Without giving away too many secrets, try entering the quicksand with nothing apart from the axe. If you get the statue, your "Bunyon" may enable you to swim out of trouble.

I could give you further hints, but it might spoil the game for others. Also, I have not progressed that far yet. Anyway, the real fun comes in solving the puzzles yourself.

Collecting for the future

I will soon by buying a Vic. I am already collecting your magazines so that I will have some software to enter when I do get it.

I think you have a good variety of Vic programs, but there is hardly ever a Vic adventure game. I would be very grateful if you could publish the odd adventure game. I think it would make a great magazine even better.

James Gillespie
39 Howden Road
London SE25

We do not publish many adventure games for two main reasons. First, few adventure games are sent in. Secondly, they take up a lot of space.

However, we would be happy to publish a Vic adventure game if other Vic readers also want one. Please write in and let us know your views.

Decorative function

Here's an interesting — and quite handy — "unsuspected function" of the ZX Spectrum. If you type three quote symbols at each end of a *Print* statement, you get a result set in quotation marks without having to bother with the special quote symbol beneath key *A*. However, the use of this gimmick is limited because it does not work inside another statement, just on its own.

You can also use the quote marks for screen decoration. For instance typing *Print* followed by 66 quote symbols will give you a full 32 character line of quotes.

Roy Kay
12 Winstanley Road
New Ferry
Wirral
Merseyside L62 1AP

If you have an opinion you want to express, or have spotted an error that needs correcting, write to: Letters, Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2.*

Missile Strike

A new game for 16K ZX81
by David Lawrence.

Missile Strike is a game for all those who like to give their alien-zapping activities a little more thought than is needed for the average 'Invaders' look-alike.

The game puts you in control of six missile bases with a limited stock of missile warheads, under attack by an ever increasing number of alien ships. Your task is to keep destroying the aliens as long as possible, without damaging the regular supply ships which sneak through with fresh supplies of warheads every now and then. Alien ships are destroyed by hitting them with a missile *or* by exploding a powerful enough missile near to them, though obviously the further away the explosion the smaller the damage. The reason it is so important to keep on destroying the alien ships is that each time one of them lands on the ground it manages to destroy some of your precious stock of warheads — how many depends on how powerful the alien ship is.

The alien ships, when they first appear, can have a shield power of anything from 0 to 9 units. If they reach the ground the number of warheads you will lose will be equal to their remaining shield power. Your missiles, on the other hand, can be loaded with multiple warheads, to values of 1, 2, 4, 8, 16 etc units.

You have a slight advantage over the alien ships, in that a direct hit from one of your missiles will effectively destroy an alien ship of twice the shield power. But, if the alien ship is precisely twice the power of your missile, it will remain on the screen as a powerless hulk which, though it can do you no damage, tends to block your shots at other ships. If your missile is not so powerful as to actually destroy the ship, the explosion will reduce the power of the ship's shields by twice the warhead value of the missile.

If your missile does not score a direct hit, it can still damage an alien ship, if it explodes close enough. The rule here is that for every unit of distance between your missile and the alien ship, the damage caused by the explosion is halved. For example, a missile with an explosive power of eight can destroy any alien ship on contact and it can destroy any ship with a shield value of up to eight by exploding next to it. But, with a one square gap between the two, it can destroy only a ship of shield-power two.

```
1000 REM ************************
1010 REM VARIABLES
1020 REM ************************
1030 DIM A$(640)
1040 DIM C$(4,6)
1050 DIM C(4)
1060 DIM D(4,2)
1070 LET C$(1)="BASE?"
1080 LET C$(2)="ANGLE?"
1090 LET C$(3)="DELAY?"
1100 LET C$(4)="POWER?"
1110 LET U$=""
1120 LET D(1,1)=29
1130 LET D(1,2)=34
1140 LET D(2,1)=28
1150 LET D(2,2)=37
1160 LET D(3,1)=28
1170 LET D(3,2)=37
1180 LET D(4,1)=29
1190 LET W=100
1200 LET D(4,2)=W+28
1210 LET S=1
1220 LET G=1
1230 DIM O$(32)
1240 PRINT AT 1,8;"[redacted]
■"
1250 PRINT AT 3,0;"DIFFICULTY? (
1-200)"
1260 INPUT H
1270 LET H=200-H
1280 REM ************************
1290 REM MAIN LOOP
1300 REM ************************
1310 LET A$(609 TO 640)="[redacted]
[redacted]"
1320 GOSUB 2210
1330 PRINT AT 0,0;A$
1340 PRINT AT 20,0;O$;O$
1350 LET D(4,2)=W+28
1360 GOSUB 1690
1370 GOSUB 2110
1380 GOSUB 1420
1390 GOSUB 2210
1400 GOTO 1340
1410 REM ************************
1420 REM PROXIMITY
1430 REM ************************
1440 PRINT AT 20,0;O$;O$
1450 PRINT AT 20,5;"*CALCULATING
 LETHALITY*"
1460 LET M1=INT (M/32)
1470 LET M2=INT (M-32*M1)
1480 LET R=INT (.5+LN C(4)/LN 2)
1490 FAST
1500 FOR J=M1-R TO M1+R
1510 PRINT AT 0,0;A$
1520 FOR K=M2-R TO M2+R
1530 IF 32*J+K<1 OR 32*J+K>608 T
HEN GOTO 1610
1540 IF A$(32*J+K)=" + " THEN GOTO
 1610
1550 IF A$(J*32+K)=" " THEN GOTO
 1610
1560 LET D=ABS (K-M2)
1570 IF ABS (J-M1)>ABS (K-M2) TH
EN LET D=ABS (J-M1)
1580 LET E=INT (C(4)/(2**(D-1)))
1590 LET A$(J*32+K)=CHR$ (CODE A
$(J*32+K)-E)
1600 IF CODE A$(J*32+K)<156 THEN
 LET A$(J*32+K)=" "
1610 NEXT K
1620 NEXT J
1630 IF A$(INT M)="+" THEN LET A
$(INT M)=" "
1640 PRINT AT 0,0;A$
1650 SLOW
1660 RETURN
1670 REM ************************
1680 REM COMMAND CYCLE
1690 REM ************************
1700 PRINT AT 20,0;O$;O$
1710 PRINT AT 21,0;"SCORE:";G-1,
"WARHEADS:";W;" "
1720 PRINT AT 20,0;
1730 FOR I=1 TO 4
1740 PRINT C$(I);
1750 FOR J=1 TO H+10
1760 LET T$=INKEY$
1770 IF T$<>"" THEN GOTO 1840
1780 NEXT J
1790 PRINT AT 10,5;"DEFAULT ON "
;C$(I)
1800 FOR K=1 TO 20
1810 NEXT K
1820 GOSUB 2210
1830 GOTO 1700
1840 IF U$<>"" OR I<>3 THEN GOTO
 1860
1850 IF CODE T$>37 OR CODE T$<28
 THEN GOTO 1790
1860 LET U$=T$
1870 GOTO 1750
1880 IF U$="" THEN GOTO 1920
1890 IF CODE T$>37 OR CODE T$<28
 THEN GOTO 1790
1900 LET T$=U$+T$
1910 LET U$=""
1920 IF CODE T$>37 OR CODE T$<28
 THEN GOTO 1790
1930 IF CODE T$<D(I,1) OR CODE T
$>D(I,2) THEN GOTO 1790
1940 LET C(I)=VAL T$
1950 PRINT C(I);"■" AND I<>4;
1960 NEXT I
1970 LET I=I-1
1980 LET C(2)=C(2)*PI/90
1990 LET C(4)=2**(C(4)-1)
2000 IF C(4)>W THEN GOTO 1790
2010 LET W=W-C(4)
2020 IF W>0 THEN GOTO 2060
2030 PRINT AT 10,3;"YOU ARE OUT
OF WARHEADS."
2040 PRINT AT 11,5;"YOUR SCORE W
AS ";G-1
2050 STOP
2060 PRINT AT 21,0;"SCORE:";G-1,
"WARHEADS:";W;" "
2070 RETURN
2080 REM ************************
2090 REM MISSILE TRACK
2100 REM ************************
2110 LET M=577+S*(C(1)-1)
2120 FOR I=1 TO 18
2130 IF A$(INT M)<>" " THEN RETU
RN
2140 LET A$(INT M)="+"
2150 PRINT AT 0,0;A$
2160 IF I=C(3) THEN RETURN
2170 LET A$(INT M)=" "
2180 LET M=M-32+SIN C(2)
2190 NEXT I
2200 RETURN
2210 REM ************************
2220 REM GENERATE ALIENS
2230 REM ************************
2240 LET G=G+1
2270 FOR I=1 TO INT (RND*(G/5)+1
)
2280 LET A=(RND*30+1)
2290 LET SH=INT (RND*10)
2300 LET A$(A)=CHR$ (156+SH)
2310 NEXT I
2320 IF INT ((G-5)/10)=(G-5)/10
THEN LET A$(A)="*"
2330 PRINT AT 0,0;A$(1 TO 32)
2340 REM ************************
2350 REM MOVE SCREEN
2360 REM ************************
2370 LET A$(33 TO 608)=A$(1 TO 5
76)
2380 LET A$(1 TO 32)=O$
2390 PRINT AT 0,0;A$
2400 REM ************************
2410 REM PENALTIES AND BONUSES
2420 REM ************************
2430 IF A$(577 TO 608)=O$ THEN R
ETURN
2440 FOR I=0 TO 31
2450 IF A$(577+I)="*" THEN LET W
=W+100
2460 IF CODE A$(577+I)>156 THEN
LET W=W-CODE A$(577+I)+156
2470 NEXT I
2480 LET A$(577 TO 608)=O$
2490 PRINT AT 0,0;A$
2500 IF W>0 THEN RETURN
2510 PRINT AT 10,3;"ALIEN ATTACK
 PRESSED HOME."
2520 PRINT AT 11,9;"YOU ARE DEAD
."
2530 PRINT AT 12,7;"YOUR SCORE W
AS ";G-1
2540 STOP
```

Your control over your missiles is expressed in four commands. Firstly, you can choose the missile base you fire from — there are six in all, spaced along the ground. Secondly, you can set a course in a limited way, since missiles can steer roughly between straight up and 20 degrees east. Thirdly, you can set a delay factor, ie how far you wish the missile to travel before exploding if there is no direct hit. Lastly, you can set the power of the missile. Using these commands, you have to try and inflict more damage on the alien fleet than the cost to you in warheads, always hoping that you can survive until the next supply ship lands and disembarks another 100 warheads. Even so, they'll get you in the end.

When you *Run* the program you will first of all be faced with a prompt to input the level of difficulty for the game. This figure sets the amount of time you have to make up your mind how to program your missile on each turn. Set it at one and you can sit back and think about everything you do, set it at 200 and you had better not blink.

After inputing your desired difficulty level you will see the ground appear, with your six missile bases and a solitary alien ship. At the bottom of the screen will be your score, which consists of nothing more complex than the number of turns you have survived, the number of warheads you have and a prompt for the base you wish to fire from.

Depending on the level of difficulty, you now have a limited time in which to input a figure between one and six. If you fail, or if you input an incorrect command, the words "DEFAULT ON BASE?" will appear in the centre of the screen and the aliens will move down one position without a missile being fired.

After the base prompt comes the angle prompt, with the same time limit. In response you must feed in a figure between zero and nine, which will be doubled to make the angle to the east of the missile's track. This is followed by the prompt for 'delay', which is the number of squares the missile will travel before it explodes — provided it does not hit anything on the way. The maximum delay is 18, since the field of play is 18 units high.

The delay input is two digits long, with a slight pause between them. If your missile is clearly going to hit something on the path you have chosen, there is no need to be precise about the delay since the missile will explode on impact anyway.

Lastly, you must input the power of your missile. This can be any power of two (including one) up to your total warhead stock. The number input should be one less than the power of two you require, ie one provides a missile of power one, two provides two, three provides four, four provides eight, etc.

Your missile will now follow its path to its explosion point and the shield power of the various alien ships is recalculated.

As you blast away, watch out for an asterisk on the screen — it is an unshielded ship that will disappear at the first whiff of an explosion. It is also your supply ship, and if you destroy it by accident, you are unlikely to be able to survive until the next one.

Missile Strike program notes

Line(s)

1030 A$ is the array which contains the whole game — all the calculations use this string, while the display is the whole string printed to the screen.

1190 W represents the number of warheads given initially — you can make the game easier by increasing this figure.

1250-1270 The variable H is used simply to set the time allowed to enter commands.

1420 This subroutine assesses the effect of the missile's explosion on adjacent alien ships. Note how the variables M1 and M2 represent the 2 PRINT AT co-ordinates that would be required if the game were actually being stored on the screen rather than in a single long string.

1680 This subroutine accepts the four commands. The loop at 1750 times the default period.

2090 This subroutine calculates the track of the missile up to the point where it either collides with an alien ship or its delay factor runs out.

2220 This subroutine generates a random number of aliens on each new line, based upon the number of moves so far.

2320-2330 Every ten lines, starting with line 5, a new supply ship is generated.

2350 One of the reasons that a single string is used to store the state of the game, apart from the ease of printing out any changes, is the ease with which the playfield can be manipulated. Line 2370 is all that is needed to move the aliens down a line.

2410 This routine subtracts from the warhead total the value of any alien ship reaching ground level, or adds 100 for any supply ship landing. ■

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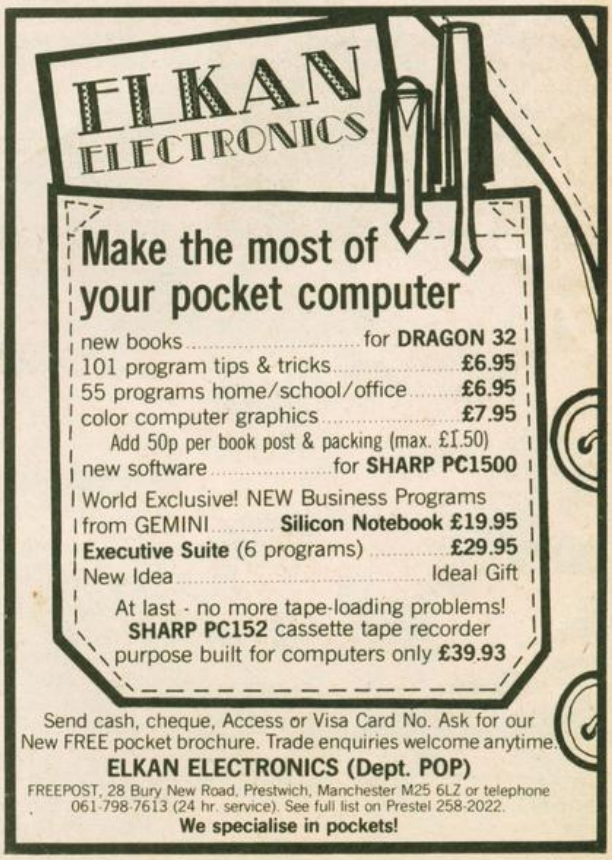


Maker of universes

***Brendon Gore** talks to Mike Singleton about Starlord – a computer moderated game.*

"So you want to rule the galaxy, huh? Well, you can take it from me that it is not going to be easy.

"First you must build up your fleet, then you have got to locate the Throne Star and finally you will have to defeat the imperial computers running the remains of the old Empyr. And, just to concentrate your mind, another 49 Starlords will be attempting to do exactly the same thing.

"But, if you plan carefully, move boldly and don't fall into any traps, you could become the next Galactic Emperor."

This is not the scenario for another *Star Wars* film or a close encounter of the imaginary kind. It is the basis of Starlord, a

Mike Singleton, Starlord organiser.

computer moderated, play-by-mail, game.

Starlord is, by computer moderated game standards, comparatively easy to play. Each Starlord game consists of up to 50 players. They are entered into a circular galaxy of 1000 stars. The Throne Star, needless to say, is at the hub of the galaxy.

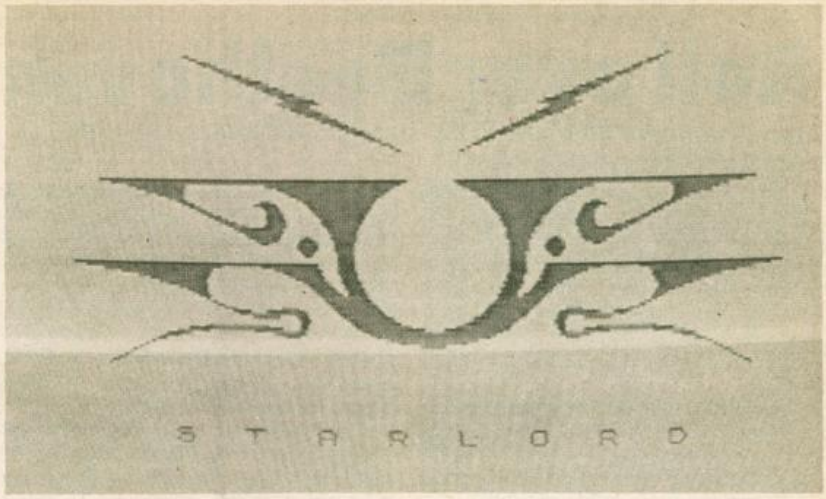
Starting play

Each player starts the game with a base star, a command ship and 50 starships. The players are also given maps of that portion of the galaxy within range of the command ship's sensors. The map contains information about the neighbouring stars and the number of starships within range.

No player starts the game within range of another player, or the Throne Star.

After examining the map, each player decides on his strategy for that turn. Starships and the command ship are deployed to attack, or defend, nearby stars.

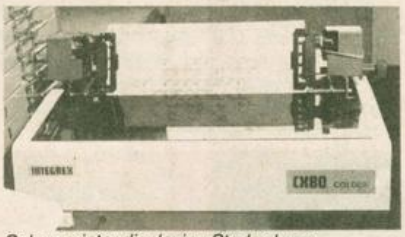
The orders for each turn are written on a tear-off sheet attached to the map and posted to Starlord organiser Mike Singleton. The date by which all orders must be posted is printed on the map. Each turn takes two weeks to complete.



Screen-shot of Starlord logo.

When all the orders are in, they are entered into a 32K Pet with 400K dual disc drives. The Starlord program then determines the outcome of each move, bearing in mind the numerical strength of each fleet and the different attack/defend modes chosen. Generally, a 2:1 advantage gives the attacker a good chance of winning, while a 3:1 advantage is usually decisive. But, as the players learn from experience, moves do not always go according to plan.

If any player drops out, or fails to post his orders in time, his command ship stays put and all his mobile starships converge on it.



Colour printer displaying Starlord map.

After all the moves have been decided, a colour printer churns out new maps for each player, showing his new position and the outcome of any battles. The maps are then dispatched to the players and a new turn begins.

The object of the game is to become Emperor of the Galaxy. To do this you must find the Throne Star and defeat the present incumbent, or the imperial computers if no other Starlord has yet succeeded in becoming Emperor. Once Emperor, you must try and defend your position against the other Starlords.

It costs £1.25 to join Starlord. This entitles you to a rule book and two turns in the game. Each subsequent turn costs £1.25. The Emperor plays for free.

There are 18 different Starlord games in progress at the moment, involving about 700 players. One edition of Starlord is an international game with players from as far afield as Papua New Guinea, Saudi Arabia and Japan. There is also an express version where each player has just one week for each move.

Starlord is the brainchild of Mike Singleton, a 31-year-old Liverpudlian. Mike will perhaps be best known by ZX81 owners as author of Sinclair's Games pack No. 1.

A former English teacher, Mike got the idea for Starlord from playing Starweb, a US computer moderated, play-by-mail game. Starweb is another space war game, but you are not provided with a map, you have to build up your own.

After playing Starweb for two years, and winning the game he was in, Mike felt that Starweb had certain deficiencies that could be improved. The result was Starlord, a program which took Mike three months to write.

The first Starlord game started in the Spring of 1981 with just six players. In July this year, Mike gave up his teaching job to devote himself full-time to running Starlord.

Next year, Mike hopes to start a new

Close-up of Starlord map.

game, provisionally called Atlantis. This will be set in medieval times and will include a detailed map of the fabled land.

As for me, I'm still waiting for the post to arrive with the results of my last move. Who wants to be Emperor? Well, I do, for one. ■

Starlord is based at 1 Rake Hey Close, Moreton, Wirral, Merseyside.

Roll over Beethoven

***Jon Chambers** attempts to trip the light fantastic on the Atari, Vic20 and Dragon 32.*

If the course of history had taken a slightly different path, Beethoven might well have had a home computer rather than Haydn or Mozart as music master. What would he have thought of these wonders of modern technology? More important, perhaps, what can computer-based music programs do for you, the aspiring musician?

Music may not be the most practical application for a domestic computer system — home finance or inventories would probably spring more readily to mind. But using computers solely for menial or time-saving tasks such as these is to ignore the more positive and interactive aspects of these versatile electronic aids. Certainly, it is difficult to think of any other type of software package that is more fun, more creative and has greater educational potential than some of the music modules now available on the market.

Musical invention, in the wider sense, is not a gift that is granted to an exclusive few. But, it does seem that, for one reason or another, the ability to write music (ie to record musical impulses on paper by way of strict conventional notation) is rather more restricted and rare a skill — and this is where computers can come to the rescue.

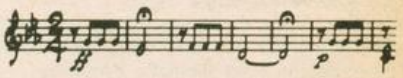
The Atari Music Composer cartridge (Model CXL 4007) was the first unit to be tested. This module forms an attractive and ambitious package and is relatively simple to use, once some of the idiosyncrasies have been successfully identified.

Firstly, and most curiously, I discovered that the computer's 'voicebox' was about a semi-tone flat in comparison with the reference standard derived from a conventional 'tuning fork' — the resonance of which can be measured quite scientifically if need be at 440 cycles per second. This discrepancy explains the variance between the Atari version of the Fifth and Beethoven's original (see Figs 1 & 2). In effect, the computer transposes the music by writing it a semi-tone higher than it sounds. (Here, Atari's key was that of C sharp minor instead of C minor — or four sharps instead of three flats.)

The discrepancy is certainly rather surprising given the sophistication of the cartridge in other respects, but should not, however, pose too much of a problem. After all, a gramophone turntable rotating at anything but the precise number of revolutions will also 'transpose' music — equally imperceptibly to most ears. And, in any case, the module comes equipped with a transpose facility to allow for minor adjustments in either direction.

The program's relatively limited span of three octaves will have a debilitating effect upon the more wide-ranging musical imaginations. The lowest obtainable note is the C below middle C, while the highest is 'high C' above the treble stave. For the majority of purposes this three-octave span will be sufficient. Works of such soaring character as Mendelssohn's Violin Concerto will have to wait for an updated six- or seven-octave module to appear before they can be accommodated on Atari staves. But, you should remember that the program was primarily intended for slightly more modest aims.

Lastly, the instruction booklet left much to be desired and differences between English and American musical idioms did not help matters. I would have felt more at home with the term 'Voice' or 'Part' instead of 'Phrase' for instance, as phrase usually means something quite different in a musical context. These misgivings apart, however, the unit performed well and would probably have incurred no more than a passing frown on the great man's brow.



Musical Dragon

The British made Dragon 32 was next in the queue. With this model the musical component is an integral part of the hardware. The *Play* command enables you very quickly and simply to write a 'string' of notes with up to 255 characters per string. Elsewhere, facilities govern tempo, pause and volume (this last function being controlled by an incremental scale between 0 and 31).

On the Dragon, the A above middle C was in closer accord with the reference A than was the Atari. Unfortunately, there is provision here for only one voice which means that harmonic experiments are impossible (and harmonising parts is, in my opinion, one of the major benefits and

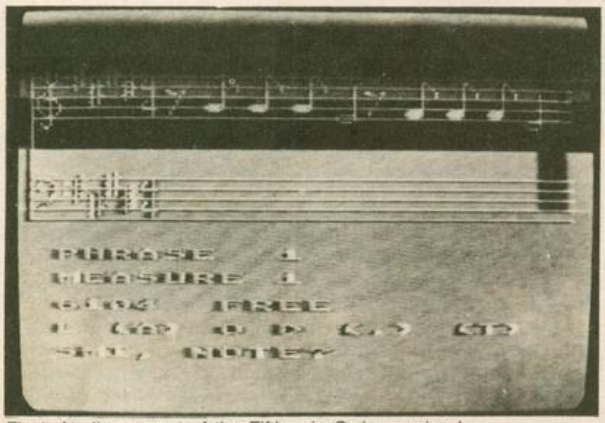


Fig 1 Atari's account of the Fifth – in C sharp minor!

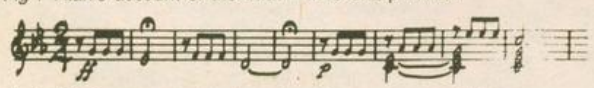


Fig 2 The famous opening bars from the score of the Fifth.

The final example uses all the modern technology of the PLAY command on a 4ØØ year old song. Would Henry be impressed?

```
1Ø A$ = "O3L2E;L1GL2AL2.BL4O+C#L2O-B.
   L1AL2F#L2.DL4EL2F#;L1GL2EL2.EL4DL2E.
   L1F#V1ØL2DV8L1O-BV6L2O+E;L1GL2AL2.B
   L4O+C#L2O-B;L1AL2F#L2.DL4EL2F#.
   L2.GL4F#L2EV8L2.D#V1ØL4C#V15L2D#.
   L1.EL1EP1;"
2Ø B$ = "O4L1.DL2.DL4C#O-L2B;L1AL2F#L2.D
   L4EL2F#;L1GL2EL2.EL4DL2E;L1F#L2D
   O-L1BO+L2B;O+L1DL2DL2.DL4C#O-L2B.
   L1AL2F#L2.DL4EL2F#;L2.GV1ØL4F#L2
   EV6L2.D#L4C#V4L2D#;V15L1.EL2EP1;"
30 PLAY "T1ØXA$;XB$;XA$;XB$;"
```

Fig 3 Henry VIII's 'Greensleeves' in Dragon 32 notation.

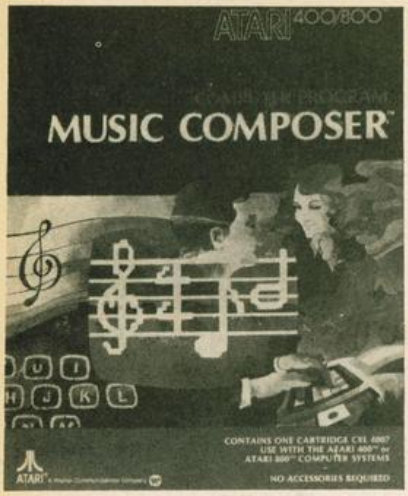


Fig 4 Atari's Music Composer Instruction booklet.

pleasures to be gained from computerised music). Because the musical element on the Dragon is created by the basic hardware rather than by any software package, the level of sophistication is inevitably lower than with the Atari cartridge. Notation remains computerish rather than musical (see Fig 3), and it does not have the ability to project musical symbols onto staves for visual display. The Dragon is therefore ideal for a computer buff with a secondary interest in music, whereas the Atari cartridge is well suited to the serious musician.

But, as an all-inclusive package, the 32 deserves the praise it has received from numerous admirers. As David Gunthorpe of Birmingham's Calisto Computers observes, 'the Dragon is the easiest of the computers to write music for'.

The award for 'the easiest of the computers to *play* music *on*', however, could well go to the Vic20. Two programs were tested for this machine, Commodore's own *Type-a-Tune* cassette and the more advanced *Vic Music Composer* marketed by Thorn EMI.

The *Type-a-Tune* cassette is an extremely basic unit which will probably have a limited appeal to the more serious musician (or computer buff for that matter). In fact, an analogy can be drawn between this cassette's capabilities and those of the kind of 'toy' keyboards that used to be so common in pre-micro days of old. To all intents and purposes the computer keyboard is converted into a musical keyboard, in that each individual key directly determines the pitch and duration of the note. Thus, the keyboard is used to play music rather than write it. The only advantage over a toy instrument, educationally speaking, is that with the cassette each note is graphically represented on screen so that the user will at least learn to associate sound and symbol.

The 'keyboard' extends to a full six

Fig 5 Ludwig van Beethoven.

octaves, but since it is necessary to change mode each two octaves (via three function keys) this point is a little academic. F1 (Function 1) activates the lower end of the musical gamut, F3 the mid-range and F5 the upper. The F7 key calls up an additional two octave range which is poetically described on the cassette inlay as 'white noise' or, to be more prosaic, sound effects.

Thorn's *Vic Music Composer*, on the other hand, is just about as sophisticated a program as any currently available in the UK. Admittedly, in comparison with the Atari, it offers a mere trio as opposed to a quartet of voices, but it has a greater musical range (encompassing four octaves), an infinitely more accessible instruction booklet which is simplicity itself to read and follow, and marginally superior packaging and presentation.

Supplier	Program	Machine	Cost	Value (1-10)
Atari UK 185-195 Ealing Road Alperton Wembley Middlesex	*Atari Music Composer*	Atari 400/800	£35.99	7
Commodore 675 Ajax Avenue Slough Trading Estate Slough Berkshire SL1 4BG	*Type-a-Tune*	Vic20	£8.69	3
Thorn EMI Upper St Martins Lane London WC2H 9ED	*Vic Music Composer*	Vic20	£16.30	8

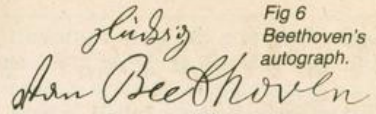


Fig 6 Beethoven's autograph.

Composition on this model is a relatively simple process. Each note is entered by selecting the appropriate note value from a bank of alternatives at the bottom of the screen (ranging from demi-semi-quaver to breve) and then 'launching' the chosen value up onto the staves in order to fix its pitch. This ingenious method obviates the need to learn the kind of formulae required to operate both the Atari and the Dragon — which, although simple and ingenious enough in their own right, do take some while to master.

So, to return to the questions asked at the beginning, it is probably fair to surmise that Beethoven would not have been thrown into ecstasies by the sound quality of the musical offerings under review. Nor would he have appreciated limitations regarding pitch, dynamic and tonal variation.

But, several points ought to be made. Firstly, these musical devices are very much geared to the requirements of the relative novice, not the musical expert. The majority of professional musicians, let alone the beginners, do not possess perfect pitch and would have difficulty distinguishing a B natural from a B flat — unlike the computer. An even more important function carried out by these computers is their ability to play different voices simultaneously.

What is more, these machines are essentially educational. They are stimulating in that they force the user to work out how to perform certain tasks (ironically, this is particularly true of those computers with inadequate or unhelpful booklets), and they undoubtedly foster a deeper interest in, and better understanding of, music. None of them actually teach you about music, but all can certainly help you to teach yourself.

The second important point to bear in mind is that musical micros are still in their infancy, and will, like precocious prodigies, improve with each passing year. In fact, it is possible to guarantee that considerable improvements on a number of the machines discussed here will appear on the market within a few months. The new Vic64 boasts a significantly better tone quality than the Vic20, so the Thorn Music Composer suddenly looks an even more effective cartridge. And, looking through Atari's American 'User-Written Program Catalog' for Summer '82, I see that a certain Lee Actor won first prize for his *Advanced Music System* which features a 5½-octave span, an instantly variable tempo control and an integral synchronisation facility to allow for up to eight voices (with the aid of a cassette recorder).

So the Beethoven of the future might conceivably be prepared to abandon the lacquered elegance of his Steinway for the keyboard of a different box of tricks. ■

Open Forum is for you to publish your programs and ideas. Take care that the listings you send in are all bug-free. Your documentation should start with a general description of the program and what it does and then give some detail of how the program is constructed. We will pay the _Program of the Week_ double our new fee of £6 for each program published.

Sea War

on Spectrum

In Sea-War you are a naval gunner based near the coast. Today is a cold foggy day and visibility is just about zero. Your intelligence men have just handed you a report advising you of an enemy fleet anchored just off the coast. It is your job to try and destroy the enemy fleet in as few shots as possible.

Your intelligence men behind the enemy lines reported the departure of:
2 Submarines (3 squares each (SSS)).
2 Destroyers (4 squares each (DDDD)).
1 Battleship (5 squares (BBBBB)).

There are, however, conflicting reports of their Aircraft carriers. One group reports that two small Aircraft carriers left the enemy port (4 squares each (AAAA)), and the other group reported the departure of one large Aircraft carrier (8 squares (AAAAAAAA)).

To play the game type _Run_ and then enter your name and the number of shells that you will require (you will need at least 27 to destroy the ships but you should not require more than 100 shots as there are only 135 spaces to shoot at).

There will then be a short pause while the computer defines some new characters and then the board will be printed. There will again be a short pause while the computer places the ships (they may be horizontal or vertical but will not be diagonal). Then you will be asked to enter the direction of your shot which should be a letter between A and O (if you wish, the range of the shot may be entered at the same time, eg, B5).

You will then be asked to enter the range as a number between 1 and 9. The computer will then fire a shot and will display a blue ripple for a miss or a red fire followed by the appropriate letter for a hit.

The computer will keep score and will start again when you have finished after first promoting you.

If you wish to give up then enter S when the computer prompts you for the direction of your next shot.

If you run out of shots or if you give up then the computer will display the position of the enemy ships using small letters for the ships or parts of ships that you have hit and using capital letters for the ships that have escaped your shots.

Program notes:

Lines
1-8 Initialisation.
10-80 Draw the board.
100-210 Position the Aircraft carrier.
300-630 Check that ships do not overlap and then place other ships.
1000-1090 Shoot.
1100-1160 You missed.
2000-2099 You hit.
3000-4020 Show where ships were hidden when out of shots or when you give up.
5000-5080 Updates the rank of the player.
9000-9100 User Defined Graphics.

The main variables are:
M$ — Ranks.
M — The (number of the) rank achieved.
N$ — Player's name.
SCO — Score.
SH — Number of shells.
S$ — The contents of the sea.
D — Direction of ship (up, down, etc.).
D$ — Direction of shot.
R$ — Range of shot.
CHR$ 144-151 — Miss "ripple".
CHR$ 152-159 — Hit "fire".
F — Various For-Next loops.

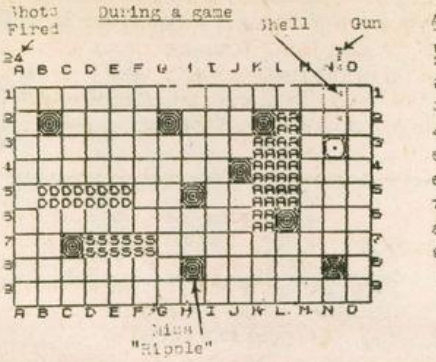
PROGRAM OF THE WEEK

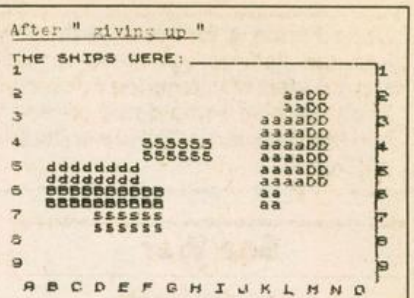
```
This game was written on a 48K
 SPECTRUM, but will work on a
 16K model

    1 DIM M$(5,22): LET M$(1)=" G
UNNER": LET M$(2)=" N. C. O.": L
ET M$(3)=" CAPTAIN": LET M$(4)="
 COMMANDER OF THE FLEET": LET M$
(5)="N ADMIRAL"
    2 LET M=1
    3 INPUT "ENTER YOUR NAME";N$:
    4 INK 0
    5 PRINT "HELLO ";M$(M,2 TO ),
N$
    6 FOR F=1 TO 1500: NEXT F
    7 CLS : LET SCO=0: INPUT "NO.
 OF SHELLS ";SH: INK 0
    8 OVER 1: GO SUB 9000
   10 FOR F=1 TO 9: PRINT AT F*2+
1,0;F;AT F*2+1,31;F: NEXT F
   20 FOR F=8 TO 248 STEP 16
   30 PLOT F,8: DRAW 0,144
   40 NEXT F
   50 FOR F=8 TO 152 STEP 16
   60 PLOT 8,F: DRAW 240,0
   70 NEXT F
   80 FOR F=1 TO 15: PRINT AT 1,F
*2-1;CHR$ (64+F);AT 21,F*2-1;CHR
$ (64+F): NEXT F
  100 DIM S$(9,15)
  110 LET X=INT (RND*15)+1: LET D
=INT (RND*4)
  120 IF (D=0 AND X<15) OR (D=2 A
ND X>1) THEN LET Y=INT (RND*4)+(
5 AND D=0)+(I AND D=2): GO TO 15
0
  130 IF (D=1 AND X<11) OR (D=3 A
ND X>5) THEN LET Y=INT (RND*8)+(
1 AND D=1)+(2 AND D=3): GO TO 15
0
  140 GO TO 110
  150 LET S$(Y,X)="A"
  160 FOR F=0 TO 3
  170 IF D=0 THEN LET S$(Y-F,X)="
A": LET S$(Y-F-1,X+1)="A"
  180 IF D=1 THEN LET S$(Y,X+F)="
A": LET S$(Y+1,X+F+1)="A"
  190 IF D=2 THEN LET S$(Y+F,X)="
A": LET S$(Y+F+1,X-1)="A"
  200 IF D=3 THEN LET S$(Y,X+F)="
A": LET S$(Y+1,X-F-1)="A"
  210 NEXT F
  300 RESTORE 0
  310 FOR F=1 TO 5
  320 READ A$,A
  330 LET X=INT (RND*15)+1: LET D
=INT (RND*4)
  340 IF D=0 THEN LET Y=INT (RND*
(9-A))+A: GO TO 400
  350 IF (D=1 AND X<(15-A) OR (D=3
 AND X>A) THEN LET Y=INT (RND*9)
+1: GO TO 400
  360 IF D=2 THEN LET Y=INT (RND*
(9-A))+1: GO TO 400
  370 GO TO 330
  400 FOR C=0 TO A-1
  440 GO TO 500+(D*10)
  450 NEXT C
  500 FOR C=0 TO A-1
  510 IF D=0 THEN LET S$(Y-C,X)=A
$
  520 IF D=1 THEN LET S$(Y,X+C)=A
$
  530 IF D=2 THEN LET S$(Y+C,X)=A
$
  540 IF D=3 THEN LET S$(Y,X-C)=A
$
  550 NEXT C
  555 NEXT F
  560 DATA "B",5,"D",4,"D",4,"S",
3,"S",3
  570 GO TO 1000
  600 IF S$(Y-C,X)<>" " THEN GO T
O 330
  601 GO TO 450
  610 IF S$(Y,X+C)<>" " THEN GO T
O 330
  611 GO TO 450
  620 IF S$(Y+C,X)<>" " THEN GO T
O 330
  621 GO TO 450
  630 IF S$(Y,X-C)<>" " THEN GO T
O 330
  631 GO TO 450
 1000 FOR S=1 TO SH
 1001 PRINT AT 0,0;: FOR F=1 TO 3
2: OVER 0: PRINT " ";: NEXT F: O
VER 1
 1002 POKE 23658,8
 1003 PRINT AT 0,0;S-1
 1010 INPUT "DIRECTION (A-O)";D$
 1012 IF D$="" THEN GO TO 1002
 1013 IF D$(1)="S" THEN GO TO 300
0
 1015 IF D$>"O9" OR D$<"A" THEN G
O TO 1002
 1017 LET V=CODE D$-64
 1020 INK 0: PRINT AT 0,V*2;CHR$
 160
 1030 IF LEN D$>1 THEN LET R$=D$(
2): GO TO 1045
 1040 INPUT "RANGE (1 TO 9)";R$
 1045 IF R$="" THEN GO TO 1040
 1049 IF R$<"1" OR R$>"9" THEN GO
 TO 1040
 1050 LET R=CODE R$-48
 1060 FOR F=1 TO R*2 STEP 2
 1065 BEEP .05,5-(F/2)
 1070 INK 0: PRINT AT F,V*2;"*"
 1075 BEEP .05,5-((F-1)/2)
 1080 NEXT F
 1090 IF S$(R,V)<>" " THEN GO TO
 2000
 1100 FOR F=1 TO 15
 1105 INK 1
 1110 PRINT AT R*2+1,V*2-1;CHR$ 1
44;CHR$ 145
 1120 PRINT AT R*2+2,V*2-1;CHR$ 1
46;CHR$ 147
 1125 BEEP .05,2-(F/5)
 1130 PRINT AT R*2+1,V*2-1;CHR$ 1
46;CHR$ 149
 1140 PRINT AT R*2+2,V*2-1;CHR$ 1
50;CHR$ 151
 1145 NEXT F
 1146 FOR F=1 TO R*2 STEP 2
 1149 LET I=ATTR (F+1,V*2)-56: IN
K I
 1152 PRINT AT F,V*2;"*"
 1153 NEXT F
 1155 NEXT S
 1157 GO TO 3000
 1160 STOP
 2002 FOR F=1 TO 15
 2005 INK 2
 2010 PRINT AT R*2+1,V*2-1;CHR$ 1
52;CHR$ 153
 2020 PRINT AT R*2+2,V*2-1;CHR$ 1
54;CHR$ 155
 2025 BEEP .05,F/5
 2030 PRINT AT R*2+1,V*2-1;CHR$ 1
56;CHR$ 157
 2040 PRINT AT R*2+1,V*2-1;CHR$ 1
58;CHR$ 159
 2050 NEXT F
 2060 FOR F=1 TO R*2 STEP 2
 2065 LET I=ATTR (F+1,V*2)-56: IN
K I
 2070 PRINT AT F,V*2;"*"
 2080 NEXT F
 2085 INK 2
 2086 PRINT AT R*2+1,V*2-1; OVER
 0;S$(R,V);S$(R,V)
 2087 PRINT AT R*2+2,V*2-1; OVER
 0;S$(R,V);S$(R,V)
 2088 IF CODE S$(R,V)>90 THEN GO
 TO 2099
 2090 LET SCO=SCO+1
 2091 IF SCO=27 THEN GO TO 5000
 2092 LET S$(R,V)=CHR$ (CODE S$(R
,V)+32)
 2099 NEXT S
 3000 INK 0
 3001 OVER 0
 3002 PRINT AT 0,0;
 3003 FOR F=1 TO 64: PRINT " ";:
NEXT F
 3005 IF S>=SH THEN PRINT AT 0,0;
"YOU HAVE RUN OUT OF SHELLS"
 3010 PRINT "THE SHIPS WERE:"
 3015 INK 2
 3017 FOR F=1 TO 300: NEXT F
 3020 FOR F=1 TO 15
 3030 FOR G=1 TO 9
 3040 PRINT AT G*2+1,F*2-1;S$(G,F
);S$(G,F)
 3050 PRINT AT G*2+2,F*2-1;S$(G,F
);S$(G,F)
 3060 NEXT G
 3070 NEXT F
 4000 INPUT "ANOTHER GAME ? (Y OR
 N)";A$
 4010 IF A$<>"N" THEN GO TO 4
 4020 STOP
 5000 FOR F=1 TO 300: NEXT F
 5010 CLS
 5015 INK 0
 5020 PRINT "WELL DONE YOU HAVE D
ESTROYED THEENEMY FLEET ";
 5022 IF M=5 THEN PRINT "I THINK
 THAT THIS IS TO EASY FOR","YOU
AND I SUGEST THAT YOU TRY";"WITH
 FEWER SHELLS": GO TO 2
 5024 PRINT "AND FOR THIS BRAVE D
EED YOU HAVE","BEEN PROMOTED FRO
M ";M$(M),," TO ";M$(M+1)
 5030 LET M=M+1
```

to next page

```
5070 PRINT M$(M)
5080 GO TO 4
8999 STOP
9000 RESTORE 9000
9001 FOR F=144 TO 160
9010 FOR G=0 TO 7
9020 READ A
9030 POKE USR CHR$ F+G,A
9040 NEXT G
9050 NEXT F
9060 DATA 32,79,144,32,64,64,64,
65,4,242,9,4,2,2,130,65,64,64,4,
64,32,144,79,32,130,2,2,2,4,9,24
2,4,4
9065 DATA 0,0,0,7,8,19,20,20,0,0
,0,224,16,200,40,40,20,20,19,8,7
,0,0,0,40,40,200,16,224,0,0,0
9070 DATA 36,65,136,20,34,73,148
,34,8,20,162,65,8,20,162,73,36,6
5,136,20,34,73,148,34,8,20,162,6
5,8,20,162,73
9075 DATA 8,20,34,65,128,0,0,8,1
29,0,8,20,162,65,8,20,8,20,34,65
,128,0,0,8,129,0,8,20,162,65,8,2
0
9095 DATA 126,60,60,24,24,24,24,
24
9100 RETURN
```





Sea War
by Sam Goodson

3-D

on Spectrum

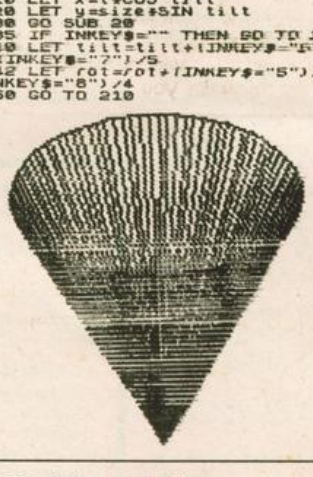
This program, which manipulates a shape defined by the operator in three dimensions, is developed round a simple circle drawing routine. If the circle is stepped round in steps of 2PI/N, a polygon of N sides will result. If the vertical axis is reduced then the shape will appear to tilt. If another circle is employed then a solid object can be represented; a prism for example.

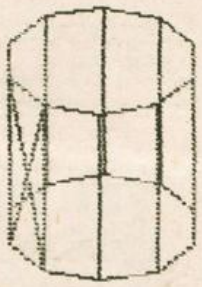
The vertical axis is reduced by dividing by *Sin* (tilt), and the distance between the centres of the two ends is calculated by *Cos* (tilt) perpendicular separation.

The controls are the standard cursor controls and the shape can be a prism or a cone, with any height, width, ratio or number of sides. A side can also be marked, to facilitate in understanding the complex pattern of lines. *FNa* converts relative drawing to absolute.

```
  1 LET s=1: BORDER 7: PAPER 7:
 INK 0: CLS
  2 PRINT "How many sides?";: I
NPUT sides: PRINT sides: LET si
es=sides/2
  3 LET c=1: PRINT "Do you want
 a cone?"; INPUT a$: IF a$="y" T
HEN LET c=0
  4 IF c=1 THEN PRINT "Do you w
ant a side marked?": INPUT a$: I
F a$="y" THEN LET s=0
  5 DEF FN a(g)=PEEK (23677+g)
  6 PRINT "How tall do you want
 it?": INPUT t
  7 PRINT "How wide do you want
 it?": INPUT size
  10 GO TO 200
  20 CLS : FOR a=rot TO rot+2*PI
 STEP step
  30 PLOT 128+size*c*SIN a,85+x+
c*y*COS a
  35 LET a=a+step
  40 DRAW (128+size*SIN a)-FN
a(0),(85+x+y*COS a)-FN a(1)
  50 DRAW (128+size*SIN a)-FN a(
0),(85-x+y*COS a)-FN a(1)
  55 LET a=a-step
  60 DRAW (128+size*SIN a)-FN a(
0),(85-x+y*COS a)-FN a(1)
  65 NEXT a
  66 IF c=0 OR s=1 THEN RETURN
  70 PLOT 128+size*SIN rot,85+x+
y*COS rot
  80 DRAW (128+size*SIN (rot+ste
p))-FN a(0),(85-x+y*COS (rot+ste
p))-FN a(1)
  90 PLOT 128+size*SIN (rot+step
),85+x+y*COS (rot+step)
  100 DRAW (128+size*SIN (rot))-F
N a(0),(85-x+y*COS (rot))-FN a(1
)
```

```
 150 RETURN
 200 LET tilt=10: LET rot=5: LET
 step=PI/sides
 210 LET x=t*COS tilt
 220 LET y=size*SIN tilt
 230 GO SUB 20
 235 IF INKEY$="" THEN GO TO 235
 240 LET tilt=tilt+(INKEY$="R")/
5-(INKEY$="7")/5
 242 LET rot=rot+(INKEY$="5")/4-
(INKEY$="8")/4
 250 GO TO 210
```





3-D
by Richard Allen

Bubbles

on ZX81

This is a 16K ZX81 program. It creates a moving display of "bubbles" (letter Os) and provides a "pin" (/) with which to burst them. The program can be made to last a longer time by increasing the value of Z at line 350. At the end of the game, you are given a score of bubbles burst and a rating. The pin is moved with the cursor keys 5,6,7 and 8.

Program notes:

Line

120 to 150 Gives instructions to start the game.

160 to 195 Variables: S = no. of bubbles burst.
Z = Counts the trips through the loop and ends game at Z = 120.
A & B = position of "pin".
C = Sets line for bubbles.

200 to 210 Prints bubbles and scrolls.

215 to 360 Moves "pin", checks (with line 216) whether pin has scored a hit, increases Z by 1 and checks value of Z.

2000 to 2050 Subroutine indicating a "hit" on a bubble. Adds 1 to variable S.

3000 to 3070 Ends game by giving final score and rating.

```
 100 REM : BUBBLES
 110 REM : EVE GORTON
 120 PRINT "HOW MANY BUBBLES CAN
 YOU BURST?  USE THE CURSOR KEYS
 TO CONTROL THE PIN (/)"
 130 PRINT "PRESS G TO GO ON"
 140 IF INKEY$<>"G" THEN GOTO 14
0
 150 CLS
 160 LET S=0
 170 LET A=10
 180 LET B=15
 190 LET C=20
 195 LET Z=0
 200 PRINT AT C,RND*30;"O"
 210 SCROLL
 215 PRINT AT A,B;
 216 IF PEEK (PEEK 16398+256*PEE
K 16399)=52 THEN GOSUB 2000
 220 PRINT AT A,B;"/"
 225 FOR J=0 TO 4
 230 NEXT J
 240 PRINT AT A,B;" "
 245 LET Z=Z+1
 250 IF INKEY$="7" THEN LET A=A-
1
 260 IF INKEY$="6" THEN LET A=A+
1
 270 IF INKEY$="8" THEN LET B=B+
1
 280 IF INKEY$="5" THEN LET B=B-
1
 310 IF A<0 THEN LET A=0
 320 IF A>20 THEN LET A=20
 330 IF B<0 THEN LET B=0
 340 IF B>30 THEN LET B=30
 350 IF Z>=120 THEN GOTO 3000
 360 GOTO 200
2000 LET S=S+1
2010 PRINT AT A,B;"POP"
2020 FOR J=0 TO 8
2030 NEXT J
2040 PRINT AT A,B;"   "
2050 RETURN
3000 CLS
3010 PRINT AT 5,5;"TIME UP"
3020 PRINT AT 10,5;"FINAL SCORE:
";S
3030 IF S>=20 THEN PRINT AT 15,1
5;"EXCELLENT SCORE"
3040 IF S<=19 AND S>10 THEN PRIN
T AT 15,5;"GOOD SCORE"
3050 IF S<=10 AND S>5 THEN PRINT
 AT 15,5;"NOT SO GOOD"
3060 IF S<=5 THEN PRINT AT 15,0;
"PRETTY USELESS.",,"WHY NOT TRY
AGAIN?"
3070 STOP
```

Bubbles
by Eve Gorton

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Pigeon Shoot

on ZX81

This is a game for the 16K ZX81. A clay pigeon appears from the left or the right of the screen, at a random height. The "F" key is pressed to fire at the pigeon and you are told whether your shot has been successful or whether you have missed. A running total of hits is given at the bottom of the screen, along with the gun position, which is fixed. The clay pigeon is represented by a shifted graphics 7 and the empty space. You cannot cheat by keeping your finger on the F key permanently, so don't try!

After 10 pigeons, you are asked whether you want to continue the game or whether you would like to know your final score. The final score is expressed as a percentage, rounded down to the nearest whole number.

Line

Program notes:

100 to 110	Sets up the variables F (no. of shots), P (no. of pigeons) and S (no. of successful hits).
120 to 160	Gives instructions to start game.
200 to 210	Sets up screen, indicates no. of hits and gun position.
300 to 330	Decides whether pigeon is left or right.
600 to 710	Sends a pigeon across the screen from the left, checks the position of pigeon when F is pressed and sends a successful hit to subroutine 900 and an unsuccessful one to subroutine 1000.
800 to 895	As lines 600 to 710, except pigeon emerges from right-hand side of screen.
900 to 995	**Subroutine for successful hit:** 900 to 910 Draws exploding clay pigeon. 915 to 920 Pause loop. 930 to 950 Blanks out exploding clay pigeon. 960 to 995 Increases value of S, prints "GOOD SHOT", pauses and returns to 200.
1000 to 1050	**Subroutine for unsuccessful shot:** 1000 to 1030 Prints "MISSED", pauses, blanks the word out. 1040 Blanks out the clay pigeon. 1050 Returns to 200.
8000 to 8510	**Subroutine** for giving choice of continuing game or going to finish. Lines 630 and 830 check the value of P (no. of pigeons). If P is greater then 10, then the program goes to 8000, giving the choice of going on or finishing.
9000 to 9050	Calculates and prints final score as a percentage.

```
  10 REM : PIGEON SHOOT
  20 REM : EVE GORTON
 100 LET F=0
 105 LET P=0
 110 LET S=0
 120 PRINT TAB 9;"PIGEON SHOOT"
 130 PRINT AT 8,0;"THE CLAY PIGE
ON(■) APPEARS FROM THE LEFT OR R
IGHT OF THE SCREEN AND MOVES ACR
OSS"
 140 PRINT AT 10,8;"PRESS F TO F
IRE";AT 15,0;"PRESS G TO START T
HE GAME"
 150 IF INKEY$<>"G" THEN GOTO 15
0
 160 CLS
 200 REM START GAME
 210 PRINT AT 21,0;"NO.OF HITS:"
;S;AT 19,16;CHR$ 133;AT 20,16;CH
R$ 128;CHR$ 5;" GUN "
 300 REM L OR R PIGEON
 310 LET Z=INT (RND*2)
 320 IF Z=0 THEN GOTO 600
 330 IF Z=1 THEN GOTO 800
 600 REM L PIGEON
 610 LET P=P+1
 630 IF P=11 THEN GOTO 8000
 640 LET X=INT (RND*11)+1
 650 FOR Y=0 TO 30
 660 PRINT AT X,Y;" ■"
 670 IF INKEY$="F" THEN GOTO 690
 680 NEXT Y
 690 LET F=F+1
 700 IF Y=15 THEN GOTO 900
 710 IF Y<>15 THEN GOTO 1000
 800 REM R PIGEON
 810 LET P=P+1
 830 IF P=11 THEN GOTO 8000
 840 LET X=INT (RND*11)+1
 850 FOR Y=31 TO 0 STEP -1
 860 PRINT AT X,Y;"■ "
 865 IF INKEY$="F" THEN GOTO 880
 870 NEXT Y
 880 LET F=F+1
 885 PRINT AT X,0;" "
 890 IF Y=16 THEN GOTO 900
 895 IF Y<>16 THEN GOTO 1000
 900 PRINT AT X-1,16;CHR$ 134;CH
R$ 2
 905 PRINT AT X,16;CHR$ 27;CHR$
27
 910 PRINT AT X+1,16;CHR$ 27;CHR
$ 14
 915 FOR J=0 TO 10
 920 NEXT J
 930 PRINT AT X-1,16;CHR$ 0;CHR$
0
 940 PRINT AT X,16;CHR$ 0;CHR$ 0
 950 PRINT AT X+1,16;CHR$ 0;CHR$
0
 960 LET S=S+1
 970 PRINT AT 13,15;"GOOD SHOT"
 980 FOR J=0 TO 15
 985 NEXT J
 990 PRINT AT 13,15;"          "
 995 GOTO 200
1000 PRINT AT 13,15;"MISSED"
1010 FOR J=0 TO 15
1020 NEXT J
1030 PRINT AT 13,15;"          "
1040 PRINT AT X,Y;" "
1050 GOTO 200
8000 CLS
8010 LET P=0
8020 PRINT AT 10,0;"IF YOU WANT
TO CONTINUE PRESS G";AT 12,3;"IF
 YOU WANT TO DISCOVER YOUR FINAL
 SCORE, PRESS S"
8030 IF INKEY$="S" THEN GOTO 900
0
8040 IF INKEY$="G" THEN GOTO 850
0
8050 IF INKEY$<>"S" AND INKEY$<>
"G" THEN GOTO 8020
8500 CLS
8510 GOTO 200
9000 CLS
9010 PRINT AT 5,0;"NO. OF SHOTS:
";F
9020 PRINT AT 7,0;"NO. OF HITS:"
;S
9030 LET T=INT ((S*100)/F)
9040 PRINT AT 15,0;"PERCENTAGE O
F HITS:";T
9050 STOP
```

Pigeon Shoot
by Eve Gorton

Addresses

on Vic20

Addresses is a fairly simple program used to retrieve names, addresses and telephone numbers stored in a single array. The array allows one line for name, three lines for address and one line for telephone number.

The ideal storage medium is, of course, a disk drive, but owing to the cost, most home users do not have one. Tape storage is, of course, common and cheap, but has the drawbacks of slow speed and only sequential access, so I decided to store data within the program using *Data* statements and retrieve it by *Read* statements.

This means that new information that is required has to be written into the program, and the updated version resaved each time. The format of the *Data* statement is important to keep the information in line. The array A$ eventually stores the information and the second parameter dictates how many name and address fields each *Data* statement must contain. This can be changed if required. Further enhancements could be made to enable any type of information to be stored and retrieved.

Program notes:

Lines

5	Sets print to black, screen and border to red, volume to 15.
10	Dimensions array to store data.
20 to 40	Loop to read information into array. Terminates on upper limit or by ready "DUMMY" Z.
45	Clears screen.
50	Asks for input of surname or 'XXX' terminates the program. Note: If two or more surnames are the same, a further qualifier is required, ie, SMITHJ, SMITHT.
60	Reads input.
70 to 90	Searches main array for name comparison.
100	Check for name not found.
110 to 125	If name found, outputs details to screen.
130	Audio bleep. Requests space bar to continue.
140	Tests for keyboard input.
150	Returns to top of processing.
300 to 8998	DATA statements. Examples shown of using commas to signify blank lines.
8999	Dummy record.
9000	End.

```
00005 PRINT"(BLK)":POKE36879,42:POKE36878,15
00010 DIMA$(100,5)
00020 FORX=1TO100
00030 FORY=1TO5:READD$:IFD$="Z"THEN45
00040 A$(X,Y)=D$:NEXTY,X
00045 PRINT"(CLR)"
00050 PRINT"ENTER SURNAME YOU":PRINT"REQUIRE":
      PRINT" OR XXX TO FINISH"
00060 INPUTB$:IFB$="XXX"THEN9000
00070 FORI=1TO100
00080 IFA$(I,1)=B$THEN100
00090 NEXTI
00100 IFI=101THENPRINT"♦♦     (RVS ON)NAME NOT
      FOUND(RVS OFF)":GOTO130
00110 PRINT"(CLR)♦♦♦♦♦♦♦"
00120 PRINTA$(I,1):PRINT:PRINTA$(I,2):PRINT:PRINT
      A$(I,3):PRINT
00125 PRINTA$(I,4):PRINT:PRINTA$(I,5):PRINT
00130 POKE36876,200:FORT=1TO20:NEXT:POKE36876,0:
      PRINT"      PRESS SPACE BAR"
00140 GETZ$:IFZ$=""THEN140
00150 GOTO45
00300 DATASMITHJ,52 NEW ROAD,DARLINGTON,,
      DARLINGTON 834641
00301 DATAJONES,144 HIGH STREET,DERBY,,
      DERBY 72245
00302 DATASMITHT,65 BRIDGE STREET,STOKE ON TRENT,
      STAFFS STOKE 554980
00303 DATAWORTHINGTON,176 CORPORATION STREET,
      STRATFORD,WARKS,
08999 DATAZ
09000 POKE36879,27:PRINT"(CLR)":END
```

Addresses
by Kevin Gray

Character Manipulator

on Vic20

My inspiration for this program came when I needed a mirror image of a character. Thus I wrote a short sub-routine to do this, and I suddenly realised what a good program it could make. Then I wrote a series of other sub-routines, finally putting them together to make this program.

The program performs three functions separately or in various combinations. These are: (1) reversing the character, (2) turning the character upside down, (3) drawing a mirror image of the character.

The cursor control symbols are written in lower case and placed in brackets: they are quite self-explanatory.

Program notes:

Lines	
6 to 50	These input the data for your character.
100 to 190	These display the menu.
200 to 290	and these find out and *Goto* the correct sub-routines.
500 to 580	These print the data and results of the final character.
590 to 670	and these find out what you want to do next.
1000 to 1060	This sub-routine reverses the character.
2000 to 2030	while this one keeps the character the same.
3000 to 3050	This one turns the character upside down
4000 to 4080	while this one forms a mirror image of the character.
10000 to 10020	This sub-routine initialises the program.

```
5 GOSUB10000
6 PRINT"{CLR}PLEASE INPUT THE DATA FOR YOUR CHARACTER"
10 FORI=0TO7
20 INPUTA
30 IFA>255ORA<0THENPRINT"INPUT INCORRECT":GOTO20
40 A(I)=A
50 NEXT
100 REM MENU
110 PRINT"{CLR}{2 DOWN}PLEASE CHOOSE FROM THE          MENU
120 PRINT:PRINT"{RVS}TYPE MODE"
130 PRINT"{RVS}A{OFF} - NORMAL"
140 PRINT"{RVS}B{OFF} - {RVS}REVERSED{OFF}"
150 PRINT:PRINT"{RVS}TYPE OF CHARACTER"
160 PRINT"{RVS}1{OFF} - NORMAL"
170 PRINT"{RVS}2{OFF} - UPSIDE DOWN"
180 PRINT"{RVS}3{OFF} - MIRROR IMAGE"
190 PRINT"{RVS}4{OFF} - HALF TURN(BOTH OF     THE ABOVE TOGETHER)"
200 REM CHOOSE AND GOTO CORRECT SUB-ROUTINE
210 INPUT A$
220 B$=LEFT$(A$,1)
230 A=VAL(RIGHT$(A$,1))
240 IFB$="B"THENGOTO1000
250 IFB$<>"A"THEN100
260 IFA=1THEN2000
270 IFA=2THEN3000
280 IFA<5THEN4000
290 GOTO100
500 PRINT"{CLR}FROM-       TO-{RVS}";
510 FORI=0TO7
520 PRINTTAB(5)A(I)TAB(15)B(I)
530 NEXT
540 POKE36869,255
550 X=7168
560 FORI=0TO7:POKEX,A(I):X=X+1:NEXT
570 FORI=0TO7:POKEX,B(I):X=X+1:NEXT
580 PRINT:PRINTTAB(5)"@"TAB(15)"A"
590 PRINT:PRINT"{RVS}PLEASE HIT A KEY"
600 PRINT"{RVS}1{OFF} - REDIFINE"
610 PRINT"{RVS}2{OFF} - RETURN TO MENU"
620 PRINT"{RVS}3{OFF} - QUIT{RVS}"
630 GETC$:IFC$=""THEN630
635 IFVAL(C$)>0ANDVAL(C$)<4THENPOKE36869,240
640 IFC$="1"THENRUN6
650 IFC$="2"THEN100
660 IFC$="3"THENEND
670 C$="":GOTO630
1000 FORI=0TO7
1010 X=A(I):Y=128:C=255
1020 IFX-Y>=0THENX=X-Y:C=C-Y
1030 IFX=0THEN1050
1040 Y=Y/2:GOTO1020
1050 R(I)=C
1060 NEXT:GOTO260
2000 FORI=0TO7
2010 IFB$="B"THENB(I)=R(I):GOTO2030
2020 B(I)=A(I)
2030 NEXT:GOTO500
3000 Y=7
3010 FORI=0TO7
3020 IFA=4THENB(Y)=H(I):GOTO3040
3025 IFB$="B"THENB(Y)=R(I):GOTO3040
3030 B(Y)=A(I)
3040 Y=Y-1:NEXT
3050 GOTO500
4000 FORI=0TO7
4010 X=1:Y=128:Z=A(I):C=0
4020 IFB$="B"THENZ=R(I)
4030 IFZ-Y>=0THENZ=Z-Y:C=C+X
4040 IFZ=0THEN4060
4050 Y=Y/2:X=X*2:GOTO4030
4060 IFA=4THENH(I)=C:GOTO4075
4070 B(I)=C
4075 NEXT
4076 IFA=4THEN3000
4080 GOTO500
9999 REM INITIALISATION
10000 POKE56,28:POKE52,28:POKE51,0
10010 FORI=0TO511:POKE7168+I,PEEK(32768+I):NEXT
10020 RETURN
```

Character Manipulator
by Simon Evans

Saturn

on ZX81

Here is a great program for a ZX81. I bought your magazine not too long ago, and in it was a program for a BBC computer. I tried the program and was so impressed I wrote it for a ZX81.

I call the program ZX Saturn because it draws Saturn with its rings using *Plot* and then draws a space ship landing.

```
1Ø FOR A=1 TO 65
2Ø PLOT 3Ø+SIN (A*Ø.1)*1Ø,2Ø+COS
(A*Ø.1)*1Ø
3Ø NEXT A
4Ø FOR A=1Ø TO 5Ø
5Ø PLOT A,2Ø
6Ø NEXT A
7Ø FOR A=1Ø TO 19
8Ø PLOT A,22
9Ø NEXT A
1ØØ PLOT 9,21
11Ø FOR A=41 TO 5Ø
12Ø PLOT A,22
13Ø NEXT A
14Ø PLOT 51,21
15Ø FOR A=1 TO 5
16Ø PRINT AT A,14;" (Graphics E,
Graphics R) "
17Ø FOR Z=1 TO 3Ø
175 NEXT Z
18Ø PRINT AT A,14;" (Two spaces) "
19Ø NEXT A
2ØØ FOR N=1 TO 2Ø
21Ø PRINT AT A,14;" (Two graphic spaces)
";AT A,14;" (Two spaces) "
22Ø NEXT N
23Ø PRINT AT A,14;" (Two graphic 6's) "
```

Saturn
by Richard Aston

Polygon-drawing

on BBC Micro

This is a very simple procedure for drawing an N-sided polygon anywhere on the screen. (N can vary from 3 upwards, although above about 18 the polygon just looks like a circle.) It is based on the equation for a circle. The X- and Y-co-ordinates being set to the required number of points along that circle, e.g. N = 3 will give a triangle.

You define five variables in the procedure — call; — "X" and "Y" are the X- and Y-co-ordinates respectively of the centre of the polygon. "R" is the radius of the circle within which the polygon is drawn or, in other words, the distance from the centre to one corner. "C" is the colour you wish the polygon to be. "N" is the number of sides.

Line 510 simply sets the graphics colour. Line 520 moves the graphics cursor to the centre of the polygon. Lines 530-560 plot and fill in a series of triangles, thus producing the polygon. Line 570 is required to fill in the last triangle and complete the polygon.

Two simple programs which use this procedure are shown below. The first simply draws different polygons in different colours and decreasing size in the centre of the screen.

The second draws circles in concentric circles. Each concentric circle being a different colour. (Again, this program is based on the equation for a circle.)

The program will work on a Model A BBC Micro. Obviously, Model B owners will be able to produce more spectacular effects.

1 Concentric Polygons

```
 10 MODE5
 20 CO = 0
 30 RA = 400
 40 FOR N = 20 TO 3 STEP -1
 50 CO = CO + 1
 60 PROCdraw (600,650,RA,CO,N)
 70 RA = RA -20
 80 NEXT
 90 END
```

2 Concentric Circles

```
 10 MODE5
 20 CO = 0
 30 FOR RA = 400 TO 50 STEP -50
 40 CO = CO + 1
 50 FOR Z = 0 TO 2 * PI STEP .09
 60 X = RA * COS(Z) + 600
 70 Y = RA * SIN(Z) + 650
 80 PROCdraw(X,Y,60,CO,10)
 90 NEXT:NEXT
100 END
```

Procedure to draw polygons

```
500 DEF PROCdraw(x,y,r,c,n)
510 GCOL0,c
520 MOVEx,y
530 FOR T = 0 TO 2 * PI STEP 2 * PI/n
540 MOVEx,y
550 PLOT,r * COS(T) + x,r * SIN(T) + y
560 NEXT
570 PLOT85,r * COS(0) + x,r * SIN(0) + y
580 ENDPROC
```

Polygon-drawing
by Daniel Giantar

Mortgage

on BBC Micro

This program will produce a quote for the monthly mortgage repayments for an amount borrowed at any given interest rate. A range of quotes can be obtained by specifying the maximum and minimum years of a period. The program is written for easy transportation to other micros.

The program runs on a BBC model B computer, but by changing line 10 to '*Mode4*' it will also run on a model A in a two-colour mode, four colours only being used to improve the presentation. The VDU and colour statements could be omitted for running on other machines.

Program notes:

Lines	
30	Select logical to physical colour relationship.
100 to 160	*Input* your data.
250 to 280	Provides the calculation.
400	Defines *Fna*(X) to round the calculations to two decimal places.
410 to 500	Sub-routine used to format the print output to give two columns of zeros after the pounds should there be no pence to print. The sub-routine is used in preference to the BBC print format instruction to make it easier to run the program on other machines.

```
 10 MODE1
 20 CLS
 30 VDU 19,3,3,0,0,0,19,2,2,0,0,0
 40 COLOUR 129
 50 PRINTTAB(8,1)"                    "
 60 PRINT TAB(8,2)"  MORTGAGE REPAYMENTS  "
 70 PRINT TAB(8,3)" ---------------------- "
 80 COLOUR 128
 90 PRINT:PRINT
100 INPUT "INTEREST RATE.....",TAB(25) I
110 PRINT
120 INPUT "SUM BORROWED.....",TAB(25) S
130 PRINT
140 INPUT "HOW MANY YEARS MAX.....",TAB(25) A
150 PRINT
160 INPUT"HOW MANY YEARS MIN.....",TAB(25)B
170 PRINT:PRINT
180 Z=FNA(S)
190 GOSUB 410
200 COLOUR 131:COLOUR 0
210 PRINT"FOR LOAN OF";TAB(30-LEN(Z$))"£";Z$
220 COLOUR 128:COLOUR 3
230 LET I=I/100
240 FOR Y=B TO A STEP 2
250 LET X=(1+I)^Y
260 LET P1=X*I*S
270 LET P2=(X-1)*12
280 LET A=P1/P2
290 Z=FNA(A)
300 GOSUB 410
310 PRINT
320 PRINT"PAYMENT/MONTH OF";TAB(25-LEN(Z$))"£";Z$;
    " FOR ";Y"YRS"
330 NEXT Y
340 COLOUR 2
350 PRINT''"DO YOU REQURE ANOTHER QUOTE"
360 COLOUR3
370 IF GET$="Y" THEN 20
380 PRINT:PRINT:PRINTTAB(8)"*** BYE FOR NOW ***"
390 END
400 DEF FNA(X)=INT(X*100+.5)/100
410 Z$=STR$(Z)
420 L=LEN(Z$)-2
430 IF L=0 THEN 470
440 IF MID$(Z$,L,1)="."THEN 500
450 L=L+1
460 IF MID$(Z$,L,1)="."THEN 490
470 Z$=Z$+".00"
480 GOTO 500
490 Z$=Z$+"0"
500 RETURN
```

Mortgage
by Barry Wells

Cube Drawer

on BBC Micro

Most microcomputer owners, especially those with *Hi-res* micro's would like to draw two-dimensional objects, but because it is commonly supposed to involve complicated maths they do not. I hope my program demonstrates how easy 3-D graphics are!

Although it is intended that *Procicd* is used in your own programs it can be used as a program in itself. The corners of the cube are:

(O,S)
(S,S)
(−S/2,S−S/2)
(S/2,S/2)

(O,O)
(S,O)
(−S/2,−S/2)
(S/2,−S/2)

where S is the side-length and (O,O) is the origin of the cube.

Program 2 with the *Proc* supplied in the 'A' version will draw a solid cube in a randomly selected colour but if the *Proc* in lines 110 to 220 is substituted with a *Proc* 'B' version then a framework cube will be drawn.

Rem statements can be left out and are not targets of *Goto*'s etc. If you are using a colour tv then type in line 70, otherwise omit it because colour differences will not be noticeable. Line 70 should be omitted if *Proc* 'B' is used.

If you do not wish to keep typing in the values for side length etc then turn line 120 into a *Rem* and take out the *Rem* in line 130.

For those of you considering conversion, details are supplied below.

Vdu 28 defines a text window for the Input statement.

VDU 19 selects the palette of colours available.

Vdu 29 defines the graphics origin, i.e. where the lower corner of the cube is positioned.

Plot 4,X,Y is equivalent to *Move* and *Plot* 5,X,Y equals *Draw* the colour is selected by C and the *Gcol* (graphics colour) statement outlines the sides of the cube (line 200).

Proc B (can be substituted for Proc A)

```
 L.
  110DEFPROCICB
  120INPUT"X,Y ,SIDE"X,Y,S:IF X=0 AND Y=0 THEN X=500:Y=500
  130VDU29,X;Y;:S=S*10
  140PLOT4,0,0
  150PLOT5,S,0:PLOT5,S,S:PLOT5,0,S:PLOT5,0,0
  160PLOT5,-S/2,-S/2:PLOT5,-S/2,S-S/2:PLOT5,S-S/2,S-S/2:PLOT5,S-S/2,
-S/2:PLOT5,-S/2,-S/2
  170PLOT4,S-S/2,S-S/2:PLOT5,S-S/2,-S/2
  180PLOT4,S-S/2,S-S/2:PLOT5,S,S
  190PLOT4,-S/2,S-S/2:PLOT5,0,S
  200PLOT4,S-S/2,-S/2:PLOT5,S,0
  210ENDPROC
  220REM *** WIRE CUBE DRAWER ***
>
```

Using Proc A in lines 110 to 220

```
>L.
   10 REM **** CUBE DRAWER ****
   20 REM **** C.BOWERMAN  ****
   30 MODE7:FORI=0TO1:PRINTTAB(4,I)CHR$141"C U B E  D R A W E R":NEXT
   40PRINTTAB(5);"DRAWS AND FILLS CUBES";TAB(5)"OF SIDE S AT X,Y";TAB(5)
"HIT SPACE TO CONTINUE"
   50 A$=GET$:IF A$<>" " GOTO50
   60MODE5:VDU28,0,1,19,0
   70REM FOR COLOUR MONITORS ONLY:-VDU19,2,4,0,0,0,19,3,2,0,0,0
   80PROCICB
   90GOTO80
  100END
  110DEFPROCICB
  120INPUT"SIDE LENGTH & (X,Y)"S,X,Y:S=S*10:VDU29,X;Y;:C=RND(3):GCOL0,C
  130REMS=RND(25)*10:X=RND(1000):Y=RND(1000):VDU29,X;Y;:C=RND(3):GCOL0,C
  140PLOT4,0,S:PLOT5,S,S:PLOT85,S/2,S/2
  150PLOT5,-S/2,S-S/2:PLOT85,0,S
  160PLOT5,S,0:PLOT5,S,S:PLOT85,S/2,S/2
  170PLOT5,S/2,-S/2:PLOT85,S,0
  180PLOT5,-S/2,S-S/2:PLOT5,S/2,S/2:PLOT85,-S/2,-S/2
  190PLOT5,S/2,-S/2:PLOT85,S/2,S/2
  200GCOL4,1:MOVE-S/2,S-S/2:DRAWS/2,S/2:DRAWS,S:MOVES/2,S/2:DRAWS/2,-S/2
  210GCOL1,C
  220ENDPROC
>
```

Cube Drawer
by Carol Bowerman

Practised entering

***Colin McCormick** presents a machine code monitor for the Vic20.*

It was never exactly easy to enter machine code into a Vic20 without an assembler, but now it is possible. This program allows hex to be entered, edited, listed, deleted, and inserted. It also allows any part of memory to be saved on tape, and read back, as well as giving dec/hex conversion and editing — with locations in both forms. You could not ask for a more powerful machine code monitor, yet it is easy to use:

*RUN

Enter what location you want to run from. If you hit *Return*, it will run from the first location (6500).

↑ EDIT DEC

When you have listed any location, you can change its value by just entering hex. Alternatively, press '↑' and you can enter decimal.

N NEW

Clears all free Ram. Do this when you first enter the monitor, and when you want to clear a machine code program.

£ LIST FROM

Press this, and enter the location you wish to see (in decimal). This will be listed, and subsequent depressions of the space bar will show the next locations.

R READ

Enters a machine code program from tape in the same location as it was written. When ready, it will show the first location.

SPC LIST

Press the space bar to display the next location.

K COPY

To save a program on tape, press *K*, then enter the first and last locations of your program.

I INSERT

Inserts spaces. Enter what location you want the insertions to start at, the end of your program (hitting *Return* will move all of the Ram up, and so waste time), and the amount of spaces. Then wait.

F1 MENU

Shows titles again.

– DELETE

As with insertion, but memory moves in opposite direction.

F3 BASIC

Returns to Basic.

F5 dec/hex

Allows any decimal number to be displayed in hex.

A brief outline of the listing is given:

0 Protects memory from Basic.
J = First available location.
K = last. Reduces keyboard buffer size, which can be a nuisance.
L = Location program is at.

10-20	Takes in instructions.
100-104	Takes in second part of hex; and pokes it in.
200-840	Reads from tape.
1000-1024	Run.
1400	No need to enter this!
2000-2015	Decimal edit.
2050	List from.
2100-2140	List routine.
3000	Sound routine.
3500-3511	Tape copy.
4000-4005	dec → hex conversion.
5000-5040	dec → hex subroutine.
7000-7505	Delete.
8000	hex → dec.
9000-9001	dec error detection.

To use the program, a list of hex opcodes is required, and a bit of practice. You can just get by with the Vic Programmers' Reference Guide. It may not be as good as *Vicmon*, but then it does not cost £35! If you are familiar with the monitor fitted to some Pet machines, you will see how useful this one is. ■

```
0 POKE55,0:POKE56,25:CLR:J=6500:K=7679:L=J:POKE649,1:V=36875
3 PRINT"■ RUN    ↑ EDIT DEC":PRINT"N NEW    £ LIST FROM"
4 PRINT"R READ   SPC LIST":PRINT"K COPY   I INSERT":PRINT"F1 MENU  -
DELETE"
5 PRINT"F3 BASIC F5 DEC-HEX":PRINT:PRINT"HEX=DEC  LOC= HEX"
10 GETA$:IFA$=""THEN10
11 H=ASC(A$):IFH=32THEN2100
12 IFH=42THEN1000
13 IFH=94THEN2000
14 IFH=92THEN2050
15 IFH=73THEN7000
16 IFH=82THEN800
17 IFH=133THENRUN
18 IFH=78THENPOKEV,200:POKEV+3,0:FORH=JTOK:POKEH,0:NEXT:POKEV+3,0:RUN
19 IFH=75THENH=J:INPUT"■COPY FROM";H:GOTO3500
20 IFH=45THEN7500
21 IFH=134THENEND
22 IFH=135THEN4000
25 U=240:GOSUB3000:H=ASC(A$):GOSUB9000:PRINTA$;
100 GETB$:IFB$=""THEN100
104 PRINTB$;:H=ASC(B$):GOSUB9000:A$=A$+B$:A=0:GOSUB8000
130 PRINTTAB(3);A;TAB(6);L;:B=L:GOSUB5000:PRINTJ$:POKEL,A:L=L+1:U=200:
GOSUB3000:GOTOT0
800 PRINT"SEARCHING":OPEN1,1,0:PRINT"READING"
805 INPUT#1,L,A:POKEL,A:H=L-1
810 INPUT#1,L,A:POKEL,A
830 IFST=0THEN810
840 CLOSE1:L=H:GOTO2110
1000 H=J:INPUT"RUN FROM";H:PRINT"■  RUN M/C■":SYSH
1021 WAIT198,1:END
1400 REM A.R.T.H.U.R. IS ALMOST AS BAD AS CITIZEN PAIN!
2000 INPUT"TO (DEC)■";A:IFA<00RA>255THEN2000
2010 POKEL,A:U=230:GOSUB3000
2015 B=PEEK(L):GOSUB5000:G=1:L=L-1:GOTO2110
2030 GOTO10
2050 INPUT"■LOC:■";L:B=PEEK(L):GOSUB5000:U=220:GOSUB3000
2060 L=L-1:GOTO2110
2100 L=J-1
2110 POKEV+3,15:POKEV,220:L=L+1:B=PEEK(L):GOSUB5000:U$=J$:B=L:GOSUB5000:S$=J$
2112 PRINTU$;TAB(3);PEEK(L);TAB(8);L;S$
2115 POKEV+3,0:POKEV+2,0:IFG=1THENG=0:GOTO2110
2120 GETJ$:IFJ$=""THEN2120
2130 IFJ$=" "THEN2110
2140 A$=J$:GOSUB3000:GOTO11
3000 POKEV+3,15:POKEV,U:FORH=1TO50:NEXT:POKEV+3,0:RETURN
3500 INPUT"LAST LOC";R:PRINT"COPYING■":OPEN1,1,1,"M/C PROGRAM FILE"
3510 FORL=HTOR:A=PEEK(L):PRINT#1,L:PRINT#1,A:NEXT:PRINT"FINISHING COPY":CLOSE1
3511 PRINT"FINISHED":GOTO10
4000 INPUT"■DEC";B:POKE36878,25:POKE36876,222:GOSUB5000:PRINTB;"(DEC)=";J$;
"(HEX)■"
4005 POKE36878,0:POKE36876,0:GOTO2060
5000 N1=INT(B/4096):D2=B-N1*4096:N2=INT(D2/256):D2=D2-N2*256:
N3=INT(D2/16)
5010 D2=D2-N3*16:N4=D2:J$=CHR$(N1+48-(N1>9)*7):J$=J$+CHR$
(N2+48-(N2>9)*7)
5020 J$=J$+CHR$(N3+48-(N3>9)*7):J$=J$+CHR$(N4+48-(N4>9)*7)
5030 IFLEFT$(J$,1)="0"ANDLEN(J$)>2THENJ$=RIGHT$(J$,LEN(J$)-1):GOTO5030
5040 RETURN
7000 INPUT"■WHAT LOC:";P:O=K:INPUT"LAST LOC:";O:INPUT"HOW MANY
INSERTIONS■";D:FORU=1TOD
7010 POKEV+3,7:POKEV,221:FORH=O-1TOPSTEP-1
7020 X=PEEK(H):POKE(H+1),X:NEXT
7030 POKEP,0:L=P-1:POKEV+3,0:NEXT:POKEV,0:GOTO2110
7500 O=K:INPUT"■WHAT LOC:";P:INPUT"LAST LOC:";O
7505 INPUT"HOW MANY DELETIONS■";D:POKEV,200:POKEV+3,7:FORU=1TOD:
FORH=P+1TOO
7510 X=PEEK(H):POKE(H-1),X:NEXT:NEXT:POKEO,0:L=P-1:POKEV,0:POKEV+3,
0:GOTO2110
8000 FORH=1TO2:A=A+(ASC(MID$(A$,H,1))-48+(ASC(MID$(A$,H,1))>57)*7)*
(16↑(2-H)):NEXT:RETURN
9000 IFH<48ORH>70ORH<65ANDH>57THENPRINT"■ERROR!■":U=140:GOSUB3000
:GOTO10
9001 RETURN

READY.

READY.

READY.

0 POKE55,0:POKE56,25:CLR:J=6500:K=7679:L=J:POKE649,1:V=36875
```

Functional Subroutines

In part two of our extract from The Working Spectrum we continue adding modules/subroutines to the Unifile program, designed to enable a single program to cover a variety of filing tasks without the need for constant re-writing every time a new use comes along.

Module 2

This simple module contains a number of very brief routines which are more economically placed into a subroutine than written out in full every time they are needed. Note the similarity here to the use of a user-defined function which serves a similar space-saving function.

If a function is always to work on the same variables then a one line subroutine can be just as effective. Defined functions come into their own when the same function is made to work upon different variables in different places.

Line 2790 could, for instance, be replaced by a defined function such as DEF FN Q$()=CHR$(LEN Q$+1)+Q$. To call up this function, however, would always take two lines, INPUT Q$ and LET Q$=FN Q$() so there would be no real saving compared to the single line necessary to call up the brief subroutine at 2780. If there were three or four different strings on which we wanted to perform this function we could have defined it as DEF FN Q$(Q$)=CHR$(LEN Q$+1)+Q$.

The function can now be applied to other strings, simply by putting the required string into the brackets when the function is called up, e.g. LET C$=FN Q$(C$). If we wanted to work on C$ with a one line subroutine, then we would need an extra subroutine to deal with C$.

The moral of all this is simply that defining functions just for the sake of it can be a waste of time. Save valuable defined functions for operations which can be applied to different variables in different places.

Commentary

The module is made up of four subroutines, as follows: 1) Lines 2780-2800. This section adds to the input Q$ the indicator that was mentioned in the introduction. The indicator takes the form of a single character. Remember that each character on the Spectrum has a unique *Code* value; a list of these values can be found in Appendix A of the Spectrum manual. The *CHR$* function can be used to select the correct character to match any value between 0 and 255, while the *Code* function translates any character into a value between 0 and 255.

Using these two functions it is possible to store values between 0 and 255 in a single character. In the case of our indicators, the single character that is added stores the length of the string, plus one for the indicator itself, so that when the string is packed into the main file of data, the indicator can be used to identify how much of what comes after the indicator is part of the same item. If the indicator has a value of 11 then the item consists of the indicator and the following 10 characters.

2) Lines 2810-2820. These lines print out item names such as name and address. Note that the indicator value is here used to extract the useful part of a line in an array. Item names are stored in A$, whose lines are 20 characters long. The difference between the length of the item name and the length of the line in the array is made up of spaces which we do not wish to print.

Line 2810 prints only that part of the relevant line in A$ which contains the characters of the item name. Neither the indicator nor the spaces are printed. This can be a powerful aid to formatting when text is stored in arrays which are longer than the text.

3) Lines 2830-2840. FN A$ extracts a single item from the main file of data and will be explained further in the next module.

4) Lines 2850-2900. This subroutine is used to print out entries from the file. The variables used will be explained in the discussion of later modules.

Unifile: *Module 2*

```
2750 REM **********************
2760 REM FUNCTIONAL SUBROUTINES
2770 REM **********************
2780 INPUT Q$
2790 LET Q$=CHR$ (LEN Q$+1)+Q$
2800 RETURN
2810 PRINT A$(I,2 TO CODE A$(I,1
));":";
2820 RETURN
2830 PRINT FN A$()(2 TO )
2840 RETURN
2850 FOR I=1 TO X
2860 GO SUB 2810
2870 GO SUB 2830
2880 LET C=C+CODE B$(C)
2890 NEXT I
2900 RETURN
```

Testing Module 2

The correct performance of these subroutines can only be effectively tested when further modules have been entered.

More of the Unifile program will be presented next week.

This is an extract from *The Working Spectrum*, by David Lawrence (price £5.95) published by Sunshine Books, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Almost to the minute

***Paul Stead** rings the changes with his clock program.*

This program draws a clock face, using the Dragon's *Circle* command. It also draws all the numbers, using the *Draw* command, and plots the sweep, minute and hour hands. And it keeps time (well just about). The clock uses most of the good graphic commands on the Dragon 32 and uses the highest resolution.

Program Notes

Line(s)	
10-50	Asks for and sets time
60	Set up arrays for hands data
67-80	Sweep hand data
87-120	Minute hand data
127-150	Hour hand data
160-220	Loads data into arrays
228-370	Draws face, figures, paints border
390-490	Works out time, draws sweep, minute and hour hand, finds out if a minute has passed, makes sound, unplots sweep hand
590-630	Minute hand sub-routine
990-1040	Hour hand sub-routine

Variables

SX(S1) Sweep hand X plot
SX(S2) Sweep hand Y plot
MX(M1) Minute hand X plot
MX(M2) Minute hand Y plot
HX(H1) Hour hand X plot
HX(H2) Hour hand Y plot
S = Second
M = Minutes
H = Hour
T = 1/50 second ■

Mission possible

***Brian Cadge** presents a program to mix text and hi-res graphics.*

Although the Dragon is not supposed to be able to mix text and hi-res graphics, this is in fact possible. All of the displayable ascii characters can be put on the graphics screen which has a resolution of 64 × 192. All eight colours may also be present at one time (instead of the usual four using *Pmode*).

Locations FFC0 to FFC5 are the display mode registers called V0, V1 and V2. To set a register an odd address is written to (*Poked*) and to clear a register an even address is written to. The registers have the following addresses:

V0 clear — FFC0 set — FFC1
V1 clear — FFC2 set — FFC3
V2 clear — FFC4 set — FFC5

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```
5 '==CLOCK COPYRIGHT SEPT 1982====Paul Stead Sheffield==========
10 CLS
15 PRINT:PRINT
20 PRINT@43,"TIME PLEASE"
21 PRINT@96,"HOURS (0 TO 11)"
22 PRINT@160,"MIN'S (0 TO 59)"
23 PRINT@224,"SEC'S (0 TO 59)"
24 PRINT@288,"SOME TIME HAS BEEN ALLOWED   TO SET UP SCREEN"
25 PRINT:INPUT"TIME";H,M,S
26 IF H>=60THENH=0:IF M>=60THENM=0:IFS>=60THENS=0:S=S+S
30 HM=H*60+M
40 H=INT(HM/12)
50 H1=(H*2):H2=(H*2)+1:M1=M*2:M2=M*2+1:S1=S*2:S2=S*2+1
60 DIMSX(119):DIMMX(119):DIMHX(119)
67 '*******************************
68 '******SWEEP DATA 0TO59(X,Y)*
69 '*******************************
70 DATA128,18,134,19,144,20,154,22,162,25,170,28,177,33,184,37,190,44,196,50,200
,58,203,63,207,71,209,79,211,88,212,96,211,104,209,112,207,120,203,128,200,135,1
96,141,190,148,184,154,177,159,170,163,162,167,154,170,144,172,134,173,128,174,1
20,173,108
80 DATA172,100,170,92,167,85,163,78,159,72,154,65,148,59,141,55,135,50,128,48,12
0,46,112,45,104,44,96,45,88,46,79,48,71,50,63,55,58,59,50,65,44,72,37,78,33,85,2
9,92,25,100,22,108,20,120,19
97 '***MIN HAND DATA0TO59(X,Y)*******************************
98 DATA128,24,136,24,143,25,152,27,160,30,167,34,173,37,179,41,184,47,192,53,195
,60,198,66,202,73,204,81,205,87,205,96,205,102,204,112
100 DATA202,118,198,126,195,132,192,142,184,145,179,150,173,155,167,158,160,162,
152,164,143,166,136,168,128,168
110 DATA121,108,112,166,103,164,96,162,88,158,93,155,76,150,70,145,65,138,60,132
,56,126,54,118,51,112,50,102,49,96,50,87,51,81,54,73,56,66
120 DATA60,60,65,53,70,47,76,41,83,37,90,34,96,30,103,27,112,25,121,24
127 '*******************************
128 '**HOUR HAND DATA0TO59(X,Y)*******************************
130 DATA128,36,135,36,140,37,148,39,154,42,161,44,165,48,170,51,175,55,180,62,19
3,66,187,71,188,77,190,83,191,89,192,96
140 DATA191,101,191,103,188,114,185,120,183,125,179,133,175,137,170,140,165,144,
161,148,154,149,148,152,140,153,134,156,128,154
150 DATA122,156,114,157,107,152,103,149,95,148,92,144,86,140,80,137,75,131,72,12
5,69,120,67,114,65,107,64,101,63,96,64,89,65,83,67,77,69,72,72,66,76,60,80,56,86
,51,92,48,95,45,103,42,107,39,115,37,122,36
160 FOR A=0TO119
170 READSX(A)
180 NEXTA
190 FORB=0TO119
200 READMX(B):NEXTB
210 FORC=0TO119
220 READHX(C):NEXTC
228 '*****SETUP FACE*********************************************************************
*****************
230 PMODE4,1:SCREEN1,0:PCLS
235 LINE(4,4)-(72,20),PSET,B
236 DRAW"BM16,6L8D12R8":DRAW"BM20,6D12R8":DRAW"BM32,6R8D12L8U12":DRAW"BM52,6L8D1
2R8":DRAW"BM56,6D12U6E6G6F6"
237 LINE(184,4)-(252,20),PSET,B
238 DRAW"BM188,6R4D3L4U3D6R4U3":DRAW"BM200,6D3L4U3D3R2D3"
239 DRAW"BM202,18D4R4U4L4D8":DRAW"BM214,18L4D4R4D4L4":DRAW"BM217,14R4L2D4":DRAW"
BM227,14L4D2R4L4D2R4":DRAW"BM229,18U2R4D2U4L4D2":DRAW"BM236,14R4D4L4U4"
240 DRAW"BM172,28U6";"&&]&&&
250 DRAW"BM206,58L5U3R5U3L5";"&&2&
260 DRAW"BM219,99L6R6U3L6R6U3L6";"&&&&3&&&
270 DRAW"BM208,139U6D3L6U4";"&&4&&
280 DRAW"BM176,171L6R6U3L6U3R6";"&&&&5&&&
290 DRAW"BM131,184U4L6U3D7R6";"&6&
300 DRAW"BM85,171U7L5";"&&7&&
310 DRAW"BM53,140L5U3R5U3L5D3R5D3";"&&&8&&&
320 DRAW"BM42,99U6L5D3R5";"&&9&&
330 DRAW"BM54,58L4U6R4D6":DRAW"BM47,58U6";"&&&&]0&&&
340 DRAW"BM85,26U6":DRAW"BM80,26U6";"&&&&]1&&&
350 DRAW"BM125,12U6":DRAW"BM134,12L5U3R5U3L5";"&&&&)2&&&
360 CIRCLE(128,96),95
370 PAINT(2,31,5,5
380 '*****TIME*************************************************************
400 TIMER=0
420 S=S+1:IFS=61THENGOSUB600
425 SOUND200,1
430 IFS1>=1190RS2>=120THEN435ELSE440
435 S1=0:S2=1
440 LINE(128,96)-(SX(P1),SX(P2)),PRESET
450 LINE(128,96)-(SX(S1),SX(S2)),PSET
460 LINE(128,96)-(MX(M1),MX(M2)),PSET
470 LINE(128,96)-(HX(H1),HX(H2)),PSET
480 P1=S1:P2=S2:S1=S1+2:S2=S2+2
490 T1=TIMER:IFT1=50THEN400ELSE490
500 '************************
595 '******MIN HAND MOVE******
599 '*******************************
600 LINE(128,96)-(MX(M1),MX(M2)),PRESET
605 CIRCLE(HX(M1),HX(M2)),6,0
610 S=1:S1=0:S2=1:M=M+1:IFM=60THENM=0
615 M1=M*2:M2=M*2+1
620 IFM=0ORM=12ORM=24ORM=36ORM=48THENGOSUB1000
630 RETURN
990 '*************************
995 '*******MOVE HOUR HAND*****
999 '*************************
1000 LINE(128,96)-(HX(H1),HX(H2)),PRESET
1020 H=H+1:IFH=60THENH=0
1030 H1=H*2:H2=H*2+1
1040 RETURN
```

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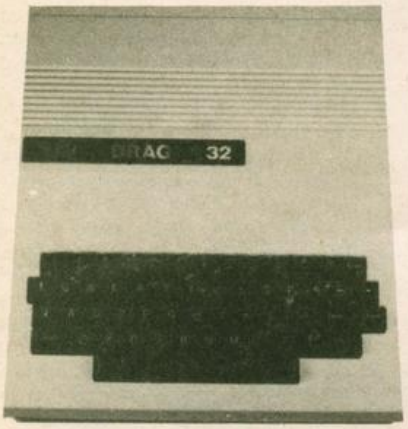
It is the combination of these registers which determines the display mode that you are in, eg all three registers cleared — normal alphanumerics.

For our special resolution of 64 × 192 with text, the registers must be set as follows: V0 — clear, V1 — set, V2 — set. This requires 6144 bytes and includes the normal text screen memory. Therefore, our screen's top-left position is at location 1024 and the last point is at location 7167.

The important part is how to write to this screen. The normal ascii characters 128-255 are the coloured graphics blocks. Take the code of the character whose top line is the combination you want and *Poke* that code into the location on the screen. To put a text character on the screen, take the ascii code of it and *Poke* this into 12 column consecutive addresses, ie add 32 each time.



The following program demonstrates the way in which the screen works. Line 10 sets up the registers to display the screen. Lines 20 to 40 fill the screen with multicoloured strips, each one pixel thick. Lines 50 onwards display the message *'POPULAR COMPUTING WEEKLY'*. As can be seen from line 80, the only ascii code that must be changed is the space character (code 32) — this becomes code 96.

```
Line(s)
 10 POKE &HFFC0,255:POKE &HFFC3,255:POKE
    &HFFC5,255
 20 FOR I = 1024 TO 7167 STEP 32:FOR J = 0 TO
    31
 30 POKE I+J,143+L
 35 NEXT J:L=L+16:IF L=128 THEN L=0
 40 NEXT I
 50 A$="POPULAR COMPUTING WEEKLY"
 60 FOR I=1 TO LEN(A$)
 70 A=ASC(MID$(A$,I,1))
 80 IF A=32 THEN A=96
 90 FOR J=0 TO 320 STEP 32
100 POKE 4100+J+I,A: NEXT J,I
110 GOTO 110
```

The best way of working out how to use this resolution is by experiment rather than demonstration.

Here are a couple of other interesting points. Locations FF00 and FF02 are the keyboard row and column locations. Also, bit 3 of location FF21 is the cassette motor control — 0 is off, 1 is on. ■

Jumping to the flag signs

Last week we explained how to modify the loader *program to accept hex by combining it with our decimal/hex converter. We also looked at a subset of opcodes for the Z80, with particular reference to* And, Or, Xor *and* Cp.

The flags which most interest us are the Carry, Zero, Overflow and Sign flags. *Cp* can alter any of these, but the one of most significance here is the Zero flag, which is set if the two values being compared are equal.

If the *A*-register contents are *less* than those of the compared byte, the sign flag is set. This is equivalent to saying "the result is negative". This is all you need to know about the flags at the moment — it is an intricate topic if you delve deeper.

The Jumps

All the conditional jumps branch (or not) depending on the contents of the flags. So, for instance, *Jpz* says "jump if the Zero flag is set". Now you can see how the *Cp* instruction can be used. Suppose, for example, that you wish to see if a particular byte, pointed at by *Hl*, contains 1E hex. If it does, we want to branch to 447B. The code is:

```
LD A, 1E   3E 1E
CP A, (HL) BE
JPZ 447B   CA 7B 44
```

All the other jumps behave similarly. *Jpnz* says "jump on a non-zero result" (zero flag *not* set), *Jpp* says "jump on a positive result" (sign flag *not* set), *Jpm* says "jump on a minus result" (sign flag set), *Jpnc* says "jump on no carry" (carry flag *not* set), and so on.

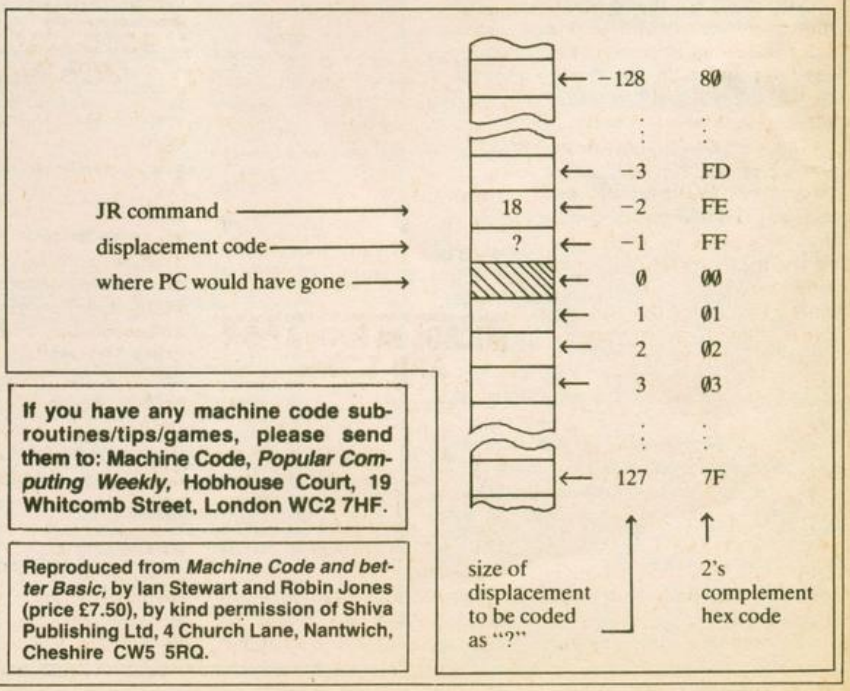
All of them have one thing in common, and that is that the address of the jump is fixed. If, for any reason, you want a routine to run somewhere in memory other than where you first loaded it, all the jump addresses must be changed. The Z80 deals with this neatly by allowing "relative jumps" (*Jr*). In other words, you can jump so many bytes forward (or back) from where you are. This displacement is held in 1 byte, so the distance which can be jumped cannot exceed 128 bytes backwards or 127 bytes forwards.

The displacement is calculated from what the *Pc* value *would* have gone to next, had no jump occurred — namely, the address of the next command in the program.

Here is an example. We want to examine each byte of memory in turn for the first occurrence of 1E hex. Assume for simplicity that the start address is already in *Hl*. We could write:

```
        LD A, 1E
LOOP:   CP A, (HL)
        INC HL
        JRNZ LOOP
```

Two points need explaining. First, we have sneaked in a new instruction — *Inc*. This is short for increment. It just adds 1 to the contents of the specified register, so the compare operation is always looking at the next memory byte because *Hl* is being bumped up by 1 every loop (*Dec*, short for decrement, does exactly the opposite). The second point is that there's no obvious difference between *Jrnz Loop* and *Jpnz Loop*. It isn't until we *assemble* the instructions into machine code that the difference is clear. ■



If you have any machine code subroutines/tips/games, please send them to: Machine Code, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Reproduced from *Machine Code and better Basic*, by Ian Stewart and Robin Jones (price £7.50), by kind permission of Shiva Publishing Ltd, 4 Church Lane, Nantwich, Cheshire CW5 5RQ.

PEEK & POKE

Is there anything about your computer you don't understand, and which everyone else seems to take for granted? Whatever your problem *Peek* it to Ian Beardsmore and every week he will *Poke* back as many answers as he can. The address is *Peek & Poke, PCW,* Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

AVOIDING THE BIG BANG

R Hargreaves of Birling Drive, Luton, writes:

Q I own a 16K ZX81, and a ZX Spectrum. As part of a school technology project, I am building a pair of joysticks. The main problem that I have come up against is how to connect the joysticks to either the ZX81 or the Spectrum.

There are two ways that I can see of doing this. Either by connecting a lead to the ribbon cable under the keyboard, or by connecting a lead to the expansion port at the back of the computer. I would prefer to use the latter method. Can you help, or do you know of any literature that would be useful?

A You do not say whether you are constructing a potentiometer or a switch joystick. I would guess that you are building a switch type as these are far more common, and you would need an A/D converter for a potentiometer. I will explain how to connect switch joysticks to the ZX81.

Although it might seem more inconvenient at first, it is safer and easier to connect the joysticks up to the underside of the keyboard ribbons, rather than to the I/O port.

There are two connectors on the ZX81 pcb for the ribbon cable from the keyboard, the five-way Data lines and the eight-way Address lines. Each of the four switches will need to be wired to a separate data line. This can be done in any order, but I would suggest switch 1 to D0, switch 2 to D1, and so on, leaving D4 unattached (this could be used for a fire button).

You will then need a single address line from any of the addresses wired to each of the switches. Again I would advise that you used A11 or A12 as this would mean that the numbers 1 to 5, or 6 to 0 were being used.

You can of course use any group of five keys, depending on the address line that you choose. When using the joystick in a program use the *Inkey$* function to read the input in the normal way. If you wanted to keep the directions exactly as on the keys, then the address line A11 would have to go to the switch controlling the movement left and address line A12 would have to go to the rest. But, unless you have a special reason for doing this it would be a lot more straightforward to use a single address line, as it reduces the chance of a potentially dangerous short circuit.

MIX-UP OVER BINATONE

Chris Beaumont of Walton Park, Walton-on-Thames, writes:

Q I have heard that the new Binatone computer which is coming out next year will use Tandy TRS-80 software. Could you tell me if this is true? If so, will it use level I, II, or III software?

A The Binatone computer seems to have been the cause of much confusion as to when it is, or is not, going to be released, or even if it really exists. It seems now that reports that it will be compatible with the TRS-80, at any level, are wrong. All that we know is that it will have standard microsoft colour Basic. The launch has been postponed and so we do not expect to see it until next spring at the earliest.

MICROS IN EDUCATION AND SCIENCE

C Hammond of Wimborne, Dorset, writes:

Q As a recent convert to computing and as a chemistry teacher, I can see great value for the use of a computer in the laboratory and as an aid to learning.

I would appreciate it if you could publish the names of software houses who specialise in education and science. Are there any User Groups who would be able to help me and other teachers. I have a Spectrum based in my laboratory. Our computer studies department has a BBC model A and B, a 380Z and a ZX81.

A The group you need to contact is EZUG, the Educational ZX Users Group. They offer an increasing amount of support by way of a newsletter. They were formed out of MUSE, Micro Users in Secondary Education, and between them they have built up a library of software for all the micros commonly found in schools. Another group you might want to contact is MAPE, Micros and Primary Education.

Most of the software produced by these groups is written by teachers for teachers, and is usually available to members. In the same way, a growing number of software houses are producing educational software. Scisoft and Calpac both deal with ZX material, while AVC write their programs for both the Sinclair and the BBC machines.

MUSE is based at 48 Chadcote Way, Catshill, Bromsgrove, Birmingham B61 0JT, and EZUG (Eric Deeson) at Highgate School, Birmingham B12. MAPE's (Barry Holmes) address is St Helen's Primary School, Bluntisham, Cambridgeshire PE17 3NY.

GOOD SOLUTIONS COST MONEY

D Clew of Beckenham, Kent, writes:

Q I spoke to someone on your stand at the recent Barbican show, who advised me to write to you. I have a problem with my BBC model B. Like the Spectrum on your stand, it suffers from barring and oscillating, with flickering characters and graphics. The degree of the problem depends on how hot my micro is, but the problem is always there.

Acorn said that this happens on all BBC computers, and most others that project a display via a television aerial socket. I was told that the problem lay in synchronising the micro's colour signal cycle with the television's and keeping it there. I know that the problem does not occur on RGB monitors, nor on composite video B/W.

The person I spoke to on your stand said that something could be done by a qualified television engineer. A device could be placed in the line between the input and the aerial.

Unfortunately, two other magazines I have written to could not offer much help. One said: 'Try a new aerial lead, and if that fails get a monitor' and the other 'Don't worry, Tim Hartnell's Atari is nearly as bad as the Spectrum in this respect'.

If the problem really is this common, you would have thought that there would be a solution. Is there?

A Yes, there is a solution, but it costs money. The problem tends to be ignored because it is so common. In most cases the screen display is adequate enough for it not to be a major worry. I can only assume from what you say that you have a worse than average computer in this respect.

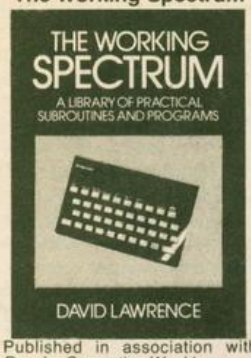
You must remember that a television has to de-code a broadcast signal, and the airwaves are full of extraneous and unwanted material. Thus the signal from your aerial goes through what can best be described as a series of filters and de-coders. These in effect 'play safe' by cutting off the top and the bottom of the signal, thus removing most of the possible interference. But, when your computer is plugged in, it also cuts out some of the signal. Just how much is left is called the bandwidth. If your computer is slightly out of synchronisation, then more of the signal will be cut. If your computer is hot, this will have a small effect on the phasing of the signal.

Televisions can be bought that have a direct video input, in addition to the normal aerial input. Unfortunately for you these are invariably for colour — the BBC video signal monitor is in black and white. To use your television you would need to wire an RGB interface to by-pass the normal signal receiving circuitry, and take the signal from the RGB output on the computer straight to the tube. I have no idea how much this would cost, but it would need to be done by a skilled electrician.

CLASSIFIED

Semi-display — £5 per single cc
Trade lineage — 20p per word
Private lineage — 10p per word

New book for Spectrum
The Working Spectrum



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Send cheques/postal orders, for £5.95, to The Working Spectrum, *Sunshine Books*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.
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SINCLAIR SPECTRUM 16K + books, joystick, games cassette, £120. Tel: Dover, Kent 204776.

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48K SPECTRUM, £180 for immediate delivery. Tel: 0503 30465 (Cornwall).

SPECTRUM SYSTEM OFFER. 16K computer, printer, plus extra paper, cassette tape recorder, four unused cassettes, full set of manuals, arcade software, including Invaders, Pacman, Scramble Asteroids, Defender, all for £185. Tel: 0458 251882.

SPECTRUM 48K + printer and Software, £220 ono. Tel: St Albans 33466 after 7 pm.

SPECTRUM 16K, £120. Tel: Rainham, Essex 20252 (evenings).

SPECTRUM 48K, with printer, 10 rolls of paper, manual, leads. etc. Virtually unused, in computer case. Cost £280, sell £275 available immediately. Tel: Potters Bar (0707) 44063 or 52834.

SPECTRUM 48K, £180, unused. Tel: 01-607 1602 (evenings).

ZX81s for sale

ZX81, manual, magazines, £30 ono. Tel: Bodmin (0208) 5972 (after 5 pm).

SINCLAIR ZX81 16K Ram Learning Lab worth £20, 8 software tapes worth £30, £90 wanted. Tel: 061-980 4592 evenings.

SINCLAIR BUILT ZX81 expanded to 16K, with printer and preferably click-type keyboard and software. Tel: Norwich 867221.

ZX81 16K, manual, power pack etc. Approximately £50. Midland area. Tel: John 0676 (Fillongley) 40680.

ZX81, 16K plus magazines and book plus £40 software, Sinclair built, £70 ono. 11 Harlesden Road, St Albans Herts. Tel: (St Albans) 34566

ZX81, 1K, Sinclair built with professional keyboard and tapes, £50. Tel: 01-852 4804 (Blackheath), evenings and weekends.

16K ZX81 with books + £40 good software, worth £140, sell for £100 ono. Mr S. R. Miles, 8 Market Street, Builth Wells, Powys LD2 3AD. Tel: (0982) 553274.

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VIC20, £120, 3K expander £15, Datasette + 18 games £45. Vic Revealed £6. Ref Guide £8. Games Book + 2 programming books £10. Machine Code cartridge + book £28. All boxed as new. Tel: 01-882 0083 now.

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VIC20, cassette deck, joystick, one cartridge + few software tapes, £200 ono. Tel: Bristol 643 569.

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ATARI 400 16K cassette recorder De-Re Atari Memory Map. software, joysticks, 3 months old, worth £378 want £250. Tel: 0642 783850.

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ATARI VCS with Combat cartridge, £50. Other cartridges, Asteroids, Space Invaders, Video Chess, Missile Command, £15 each. Othello £12, Breakout, Basketball £10 each. Tel: Norwich 712320 after 6 pm.

ATARI VIDEO COMPUTER with Combat, Space Invaders and Chess cartridges, £80. Tel: 01-337 6163 evenings.

ATARI VCS, plus Combat, Asteroids, Space Invaders, Air Sea Battle, cost £170 new sell for £110 ono. Tel: Long Eaton 61371.

ATARI VIDEO SYSTEM, plus 7 cartridges, including Asteroids, Missile Command + Soccer, etc., £150. Tel: 01-262 7006.

ATARI TV GAME plus 4 cartridges: Space Invaders, Combat, Adventure, Skiing, £100. Tel: Basildon 27054.

ATARI TV GAME SYSTEM, inc. Asteroids, perfect condition, £85. Tel: 01-582 8791 (after 4 pm).

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TANDY TRS/80, MODEL 1, with monitor, expansion interface, and single disc drive, £400 ono (or will sell parts separately). Tel: Ian Soutar Langton, Langton Green, Kent. Tel: 2088.

TANDY TRS80, Level 2 16K, with line printer VII, £550. Tel: Bracknell 51881, Mr Cuttill.

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TANDY POCKET COMPUTER 2 and plotter with programs, £250 ono. Tel: 01-937 5578.

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VIDEO GENIE 1, 16K, with various software, good condition, £190 ono. Tel: Harlow 414434 after 6 pm. Mr McKellow.

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WANTED. 16K SPECTRUM. Tel: 025-671 2134, ask for extension 431 (Mr. Les Booth).

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WANTED. ZX81 with 16K Ram PAC. Please Tel: Martin Lyons, Heckmondwike (0924) 409425.

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WANTED. BBC MODEL B. 56 Green Ore Street, Belfast BT6 8NS.

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What's Happening 01-930 3271

Details of exhibitions, courses, micro fairs and clubs. For your free entry in What's Happening ring 01-930 3271.

Exhibitions and courses 1982

November 25-27 (Thurs-Sat)
Northern Computer Fair, Belle View, Manchester. Entry £2 and £1. Open 10 am—6 pm.

December 5 (Sunday)
Humberside Computer Fair, Winter Gardens, Cleethorpes, Humberside. Entry 40p and 20p. Open from 11 am to 6 pm. Contact Jenson Lee, 29 Park View, Cleethorpes (Tel: 0472 42559, day time).

December 11-12 (Sat-Sun)
Christmas Microfest '82, University of Manchester Institute of Science and Technology, Sackville St, Manchester. Entry £1 and 50p. Open from 10.30 am.

December 18 (Sat)
Fifth ZX Microfair, New Horticultural Hall, Greycoat Street, London, SW1. Open 10 am—6 pm. Contact Mike Johnston (01-801 9172).

Exhibitions and courses 1983

January 10-15 (Mon-Sat)
Apple Tuition Courses, University of Salford. Two and three day courses: Apple for Beginners and Getting More From Your Apple. Contact Mrs S R Hill, Microprocessor Short Courses Unit, University of Salford (061 736 5843 ext 248).

April 3-17 (Sun-Sun)
London Computer Festival. Two weeks of computer events. Contact Robin Bradbeer, Association of London Computer Clubs, Polytechnic of North London, London, N7.

April 28-30 (Thurs-Sat)
Midland Computer Fair, Bingley Hall, Birmingham. Contact IPC Exhibitions (01-643 8040).

June 16-19 (Thurs-Sun)
The Computer Fair, Earls Court, London. Contact IPC Exhibitions (01-643 8040).

September 29 — October 2 (Thurs-Sun)
The Sixth Personal Computer World Show, Barbican Centre, London.

Clubs

Walsall ZX-Aid/Sinclair Users Club meets on the first and third Thursdays of the month at 7.15. Contact Conrad Roe, 25 Cherry Tree Avenue, Walsall enclosing SAE or phone Walsall 25465 after 6 pm.

Chelmsford ICPUG Branch. Local Commodore users contact Tony Surridge, 97 Shelley Road, Chelmsford., Essex enclosing SAE or phone Chelmsford 81878 after 6 pm.

Preston Atari Computer Enthusiasts. Mainly Atari but Apple, Tandy, Vic and Sharp users also welcome. Meets on third Thursday of each month, membership £5 and £2.50. Contact R Taylor, 177 Forest Drive, Lytham St Annes, Lancs or phone 0253 738192.

Furness Computer Club meets fortnightly on Wednesdays in the Brown Cow, Dalton, Furness at 7.30 pm. Contact R Wade, 67 Sands Road, Ulverston, Cumbria enclosing SAE or phone Ulverston 55068.

Nottingham Microcomputer Club meets on the first Tuesday of most months at 7.30 pm in the Friends' Meeting House, Clarendon Street, Nottingham. Contact E Harvey, 68 Rosleigh Avenue, Mapperley, Nottingham enclosing SAE or phone 0602 608491 (evenings).

Lancaster and Morecambe Microcomputer Club meets on alternate Tuesdays. Contact David Smith on Lancaster 33279.

Wolverhampton/Telford Vic Users Group is being formed. Contact J Bowman, 6 The Oval, Albrighton, Wolverhampton, West Midlands enclosing SAE.

Grimsby Computer Club meets on alternate Mondays at 7.30 pm in the Central Library, George Street, Grimsby. Family night on 24 November. Contact Jenson Lee, 29 Park View, Cleethorpes (Tel: 0472 42559, day time).

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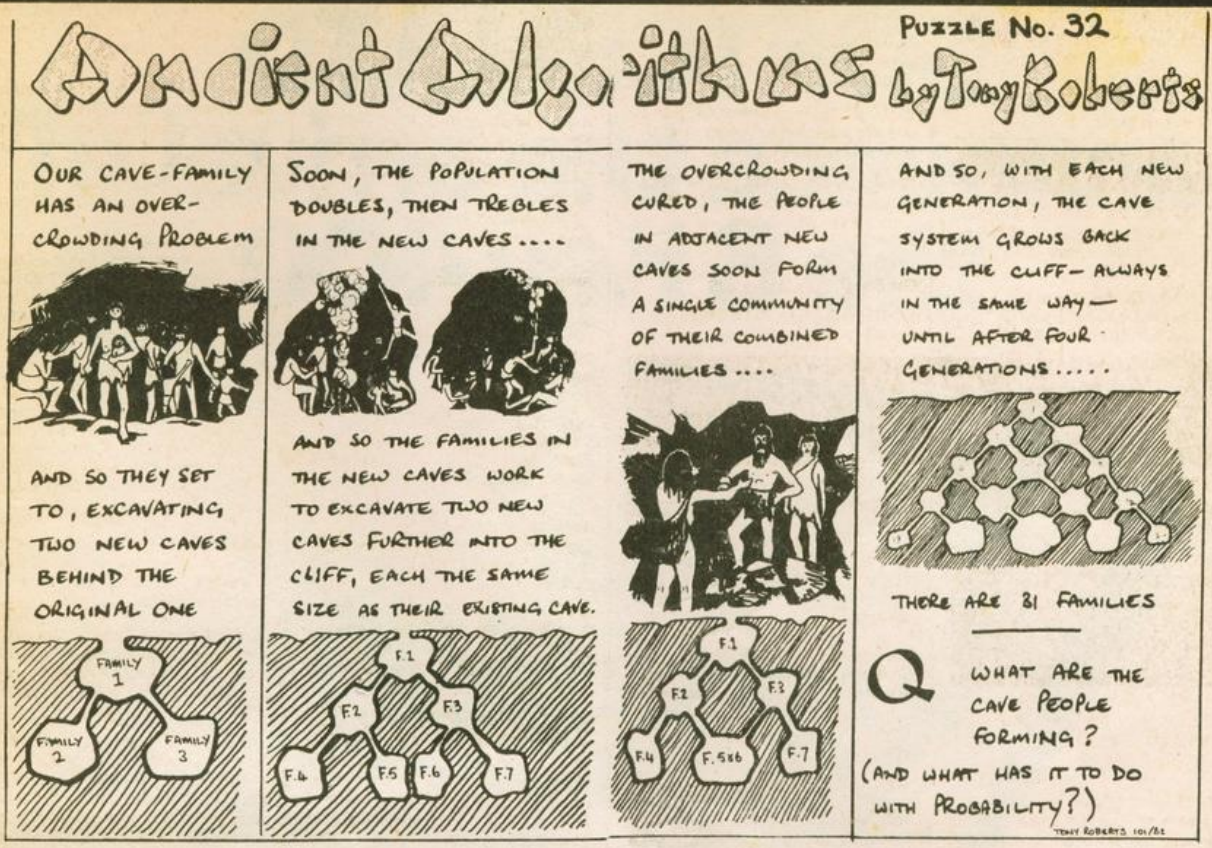
Competition



Solution to Puzzle No. 26

This algorithm is calculating the sum of series 1 + 2 + 3 + 4 . . . + *n*, where *n* is the number of stones in the heap. In mathematical notation Σ, the Greek letter capital sigma, is used to indicate such a summation. In this case it would be written as $\sum_{1}^{n} x$, where *x* is the sum of the series from 1 to *n*. The 1 and *n* are called the limits of the sum and are written at the top and bottom of the sigma.

The algorithm shown makes use of the expression $\sum_{1}^{n} x = \frac{1}{2}(n+1)n = \frac{n^2 + n}{2}$

A Basic program to do the same is:

```
10 INPUT H
20 P = H
30 P = INT(P/2)
40 M = H - (2*P)
50 H = H + (H*P)
60 IF M = 0 THEN H= H - P
70 PRINT H
```

Winner of Puzzle No. 26

The winner is: A Moore, High Street, Bala, Gwynedd, who receives £10.

ZIGGURAT

The numbers game

In their desire to paint a rosy picture of what is in store for us, many futurologists seem to ignore the great difference beteen "will" and "might". Prophesying the future is fun, and it can be an amusing game, as long as we remember not to take ourselves too seriously. Neil Ardley's book *Health and Medicine* (in the World of Tomorrow Series, 1982, £3.99, 37pp) is an example of a book which takes itself far too seriously, in an area which is the subject of great debate.

What are we to make of this book, which says (without any qualifications) that in tomorrow's world artificial limbs *will* work "as well as real ones or perhaps even better"? Not a might but a will. Some *might* say that it does no harm to give this to young, unsophisticated, children — after all they are only children; but we have to consider, not only the expense, but more importantly the style of thought attitudes represented by such a book. As medicine develops, so does society: in health care it is now realised that to care for a patient does not need to mean a recourse to high technology — rather, many patients are best treated within the community.

In books like *Health and Medicine* the human side seems to be forgotten. Respect for the individual is lost and a desire to make humans as alike as possible appears — deviations from the normal will be removed. (Though who can say what is normal?)

In Ardley's world of the future the computer is everywhere, and one of the functions of the computers will be to give you advice. There is still a place for the doctor, though. We are told that a doctor will be present to discuss the results of the computer's diagnosis, if the patient wishes. But, if the computer is so competent at diagnosis, one would think it should be able to discuss its own behaviour.

The section "Hospital of the future" concerns an operation to replace a severed arm by microsurgery. The operation is predicted to be very intricate because tiny nerve endings and blood vessels have to be fixed to each other. "The robots work tirelessly and with great precision and speed to repair the damage." Not wishing to appear too anti-human, the author informs us that human surgeons check the robots via television and make sure that the patient remains in good condition. Why are the surgeons not there? And why must they use television?

The section "Bionic people" informs us that, for artificial limbs, computers *will* be linked to the nerves that normally carry impulses from our brains to our muscles — a person will only have to think of a movement and the artificial limb will perform it. It is at this point that Ardley states that artificial limbs *will* be better than the real thing. Bernard Wolfe (in 1952) wrote a book *Limbo '90*, in which he took ideas from the new science of cybernetics, to produce a future where young men underwent voluntary amputation of limbs, to be replaced by artificial limbs — because artificial limbs were superior. *Limbo '90* was considered in its day to have brought a new dimension of terror to science fiction.

Ardley's book shows us how an unreflective enthusiasm for information technology can lead us to a technological utopia devoid of humanity.

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